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Provisional Scientific Intelligence Report

TYURATAM MISSILE TEST RANGE LAUNCH FACILITIES

NOTICE

The data and conclusions of this finished intelligence report are provisional and do not necessarily reflect the final position of the Office of Scientific Intelligence. Nevertheless, the material is being published at this time for use by the Intelligence Community until a firm estimate can be established.

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30 September 1963

CENTRAL INTELLIGENCE AGENCY
OFFICE OF SCIENTIFIC INTELLIGENCE

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PREFACE

One of the primary inputs to assessment of Soviet ICBM research and development has been the data derived from the construction and continuing development of the Tyuratam Missile Test Center. This report updates intelligence on launch facility construction at Tyuratam and is based primarily on good quality photographic coverage during the spring and summer of 1963. This report correlates a detailed analysis of research and development facilities at Tyuratam with data on both Soviet and U.S. deployed missile sites in order to improve contributions to the continuing assessment of Soviet ICBM development.

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Two representatives of the Space Technology Laboratories, Project [] contributed to the technical analysis in this report, and the CIA detachment at NPIC provided assistance in the photographic analysis as well as providing the necessary graphic preparation and reproduction services. The cutoff date for data used in this analysis is 17 July 1963.

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TYURATAM MISSILE TEST RANGE LAUNCH FACILITIES

PROBLEM

To assess the significance of launch facilities at the Tyuratam Missile Test Center.

CONCLUSIONS

1. The continuing high rate of construction at the Tyuratam Missile Test Center indicates that the Soviets not only plan to continue active use of all the present facilities, but are developing new facilities for the testing of new missile systems.

2. The probable guidance facility associated with the SS-6 has been identified both at Launch Complexes A and B and at the SS-6 operational deployment sites at Plesetsk.

3. The construction of two new large buildings at Launch Complex B suggests that additional activity, possibly the testing of a new space booster and/or space vehicle, is planned for this facility.

4. Launch Complex C is being modified to permit field testing and training with the latest SS-7 operational soft site configuration.

5. Launch Complex D consists of two hardened launch sites, D-1 and D-2, each comprised of three silo-type launch facilities. All three silos are believed to be for missile launching.

6. Excellent photographic coverage of Launch Complex E during the spring of 1963 shows three launch sites, E-1, E-2, and E-3. Launch site E-3 is the prototype of the launch sites associated with the SS-8 operational soft complexes. Similar electronic facilities that are possibly guidance associated are located at Complexes A and E and at the SS-8 operational soft sites.

7. SS-8 operational soft sites at Gladkaya are being modified to, or replaced by, the SS-7 soft site configuration. The SS-8 soft sites at Plesetsk D and E appear to be complete or very

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near completion. The SS-8 soft sites at Tyumen A and C appear to be still under construction. It is not yet possible to determine the extent of activity at the SS-8 sites at Tyumen B or at Kozelsk.

8. Launch Complex F appears to be in the late stages of construction and to consist of three silos spaced approximately 180 feet from center to center. All three silos are believed to be for missile launching. Operational hard site construction at Omsk and Kozelsk appears to differ from the SS-7 hard sites and probably represents the deployment version of the Complex F configuration.

9. Construction at Launch Complex G continues. The original launch area will probably

contain two launch sites approximately 900 feet apart. In addition, a second similar probable launch area with two launch sites is under construction about 2 miles east of the original launch area. Two L-shaped facilities, possibly interferometers, have been located behind the original Complex G launch area. Completion of this Complex is not expected before mid 1964.

10. Complex H is located between Complexes C and D and probably represents a new ICBM launch area. An L-shaped electronic facility with legs approximately 1,200 feet long is associated with the Complex. Completion of Complex H is not expected prior to the first half of 1964.

SUMMARY

No significant additions have been made in the Launch Complex A area since October 1962. This Complex has been associated with the SS-6 and SS-8 ICBM's and Soviet space launchings. However, it has been possible to distinguish SS-6 guidance systems in use at launch pad A-1 and at Launch Complex B on 1963 photography. It has also been determined that the rail line which runs into the A-2 pad area probably abuts the west side of the launch pad.

Significant additions at Launch Complex B (also associated with the SS-6 and possibly Soviet space systems) consist of two large buildings, one a rail pass-through building and the other, at present, a road-served building. When completed, the latter will be the third largest building in the Tyuratam rangehead area.

At Launch Complex C (a soft launch facility for the SS-7), two canted buildings of the kind noted at the new-type SS-7 operational soft sites have appeared adjacent to the C-2 site.

Launch Complex D (a hardened launch facility for the SS-7) consists of two silo launch sites,

designated D-1 and D-2, each containing three silos separated approximately 180 feet (center-to-center) along a straight line. All three silos at each site probably can launch missiles, although this cannot be determined conclusively. The left silo as seen from the control bunker has always been indistinct or nonexistent on photography of all such sites during the early and mid-stages of construction. This suggests that it is started later than the other two and possibly serves a different function. On the other hand, all three silos appear to be identical during the terminal construction phases and at completion, therefore it is believed that they probably are all missile launch silos. Construction of site D-1 was probably completed around October 1962 after about 22 months of work. The excavation at D-2, about 4,100 feet east of D-1, has not been backfilled as yet, but completion of this site is expected by the end of 1963.

Launch Complex E (a soft launch facility for the SS-8) contains three launch areas, two of which (E-1 and E-2), are flat pads about 150

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feet square located 800 feet from the probable missile-ready buildings and surrounded by three above-ground structures located close to the pad. The third area (E-3) is a flat 150-foot-square pad with buried adjacent structures. The similarity between E-3 and the launchers at the SS-8 operational soft sites indicates this to be the probable operational prototype. Other similarities--such as road patterns, separation distances, and the existence of both triad and 1,200-foot interferometers--also indicate that Complex E is related to the SS-8 operational soft sites, although in some respects, the arrangement of the research and development facility is reversed from the deployed sites. The exact purposes of the triad interferometer and the 1,200-foot one are not evident at this time, although both have possible guidance application. Construction scheduling analysis suggests that the triad may represent the initial guidance concept and the longer base-line system a secondary or backup concept. In both cases, the system orientation is such as to place one leg of the interferometer in the field of fire. Siting requirements apparently specify that the loading axis be situated 45 degrees from the center of the launch azimuth sector.

Analysis of FLIM FLAM has indicated that the SS-8 missile was initially tested from Complex A. However, in June 1962 an SS-8 firing was conducted, or at least controlled, from Complex E. Similarities of the guidance installations and the launchers at Complex E and at A-2 support the probability of SS-8 firings from both Complexes.

Launch Complex F, located about 7 miles northwest of Complex E, is a hardened launch site under construction. Based on the location of Complex F and the association of nearby Complex E with soft SS-8 operational sites, it is postulated that Complex F represents the hardened

configuration for the SS-8. It contains three silos in a linear pattern, with center-to-center separation distances of 180 feet. In this respect, it is similar to the launch sites at Complex D. However, it appears dissimilar to these sites in several other ways, including the modes of construction, the positioning of the control bunker, and the appearance of the individual silos. Little usable photography is available for this type of site, and it is not possible to determine conclusively if all silos are launch silos, although this is believed to be probable.

The extremely limited data base also precludes making a definitive estimate of average construction phasing for the launch site at Complex F, but construction has been underway for about 22 months and appears to be nearing completion. Only two other possibly similar sites have been identified (at Omsk and Kozelsk), and their photographic coverage is also inadequate for determining construction time.

Launch Complex G is the largest test complex in the Tyuratam rangehead area. It now consists of one launch area containing probably two launch sites, a second area which will also probably contain two launch sites, and a single large support areas. Construction is still underway in all three areas. An electronic facility, consisting of two possible L-shaped interferometers, has been located behind the launch area. Complex G will probably not be completed before the middle of 1964. Due to its overall size, it would appear to be intended for the next generation space system, which in an ICBM role could be used to deliver a 100-megaton weapon. However, the probable pad spacing (900 feet), the bunkered aspects of all structures in the launch area, the number of probable launch points, and the revetted area being constructed west of the

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main area also suggest the possible use of this Complex as a test facility for a solid propellant ICBM.

Complex H, located between Complexes C and D, is in an early stage of construction. The direction in which the construction extends and the proximity of a new partially completed guidance/missile-tracking electronic facility suggest that Complex H will be an ICBM launch facility when completed. Its location between Complexes C and D and its proximity to the SS-7 support area suggest that it may be for a radio-guided version of the SS-7 system. Construction work is too preliminary to permit an estimate

of the completion date, but completion would appear to be possible no earlier than the first half of 1964.

New construction has appeared between Complexes A and B and between Complexes E and A, but the construction is not far enough advanced to permit assessment of purpose. The location, orientation, and spacing of these new areas, however, suggest that they will be additional launch complexes. New construction has also been observed west of Complex G. The purpose of this construction as well as its relation, if any, to Complex G cannot be determined at present.

DISCUSSION

INTRODUCTION

An improved, and in some cases, a revised, understanding of the ICBM launch facilities associated with the Tyuratam Missile Test Range (TTMTR) has resulted from excellent quality photography that was obtained during the spring and summer of 1963. This coverage also clearly indicates that the construction of new facilities at Tyuratam is continuing at a very rapid pace. Figure 1 presents a layout of the facilities at Tyuratam and contrasts the appearance of the rangehead in October 1962 to that in June 1963, only nine months later. Figure 2 presents the rangehead construction schedule as derived from sequential photographic coverage.

LAUNCH COMPLEX A

Excellent photographic coverage of the Tyuratam rangehead area in April and June 1963 revealed no significant changes in the A-1 launch pad area (figure 3). However, the high quality of the photography permitted the guidance facility for the SS-6 system to be observed clearly, both

at launch pad A-1 and at Launch Complex B. This guidance facility has been apparent on Launch Complex A photography since late 1959. It consists primarily of three buildings and an oval-shaped antenna pad. One of the buildings is large (180 by 60 feet) and the other two are smaller (70 by 50 and 85 by 50 feet). The radar antenna pad, located about 350 feet from the large building, has three objects on it which measure about 30 feet in diameter. Two additional objects located about 2,630 feet northwest of the large building are believed to be a bore sighting device and a theodolite. Alignment of the various parts of the guidance system indicates that the facility at Launch Complex A was installed with equal emphasis on its use for firing both to the United States and to Kamchatka. Appearance of the new guidance system at about the same time as the appearance of the SS-6 light re-entry vehicle and use of the same guidance system at the four SS-6 operational sites at Plesetsk indicate that the system is associated with the operational version of the SS-6. The guidance facilities at Complex B and at the SS-6 launch com-

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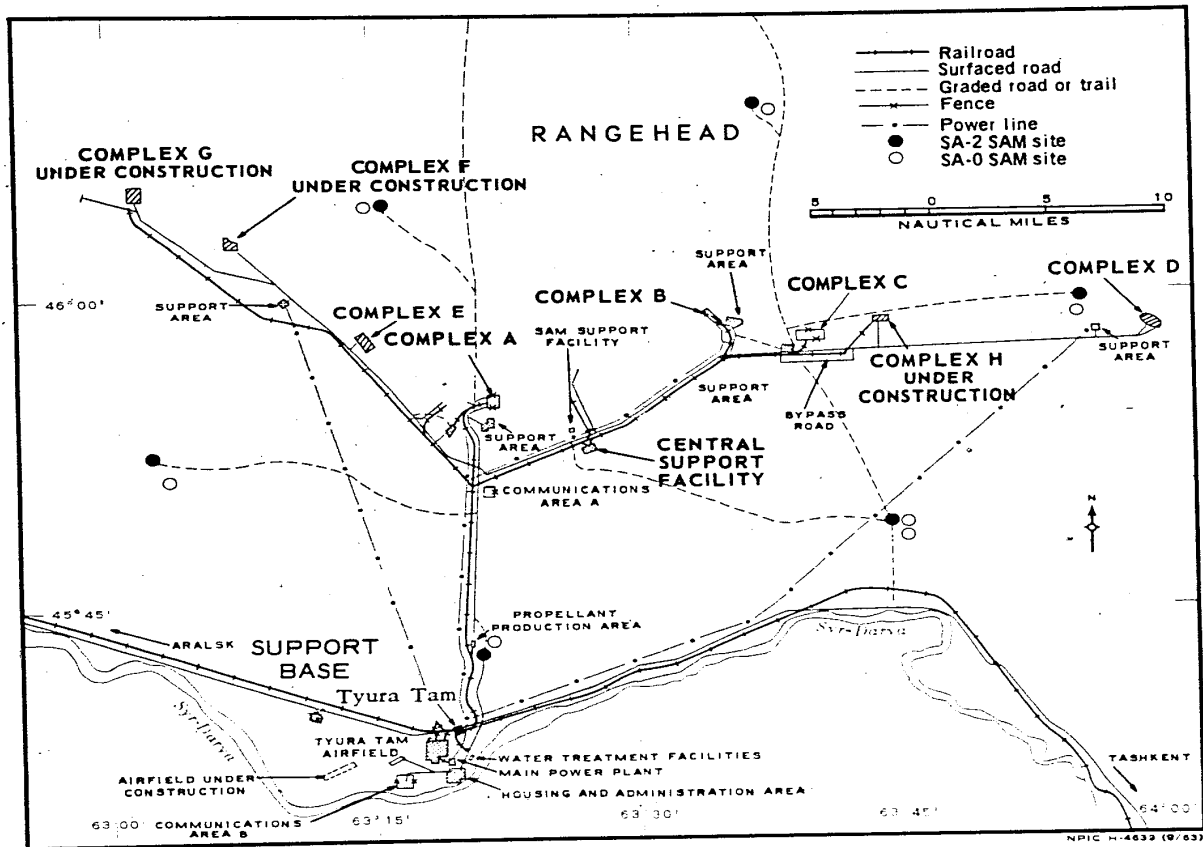


FIGURE 1. TYURATAM MISSILE TEST RANGE, OCTOBER 1962 AND JUNE 1963.

plexes at Plesetsk are oriented along the firing sector to U.S. targets.

No significant changes are apparent in the launch pad A-2 area within the last year. However, April 1963 photography was of sufficient quality to determine that the railroad probably extends to and abuts the west side of the launch pad (see figures 3 and 4). This suggests that missiles may be delivered to launch pad A-2 by rail as well as by road. Discussion of the guidance facilities associated with launch pad A-2 is included under Launch Complex E.

LAUNCH COMPLEX B

The guidance system at Complex B is similar to that associated with launch pad A-1. While some variation occurs in the spacing of the various parts of the system, the main difference between the two is in the orientation of the radar antenna pad. Comparison of the radar-antenna-pad orientation with that of A-1 and of the SS-6 operational sites at Plesetsk suggest that the Complex B facility was installed with operational firings to the United States as a primary con-

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ESTIMATED RANGEHEAD CONSTRUCTION SCHEDULE

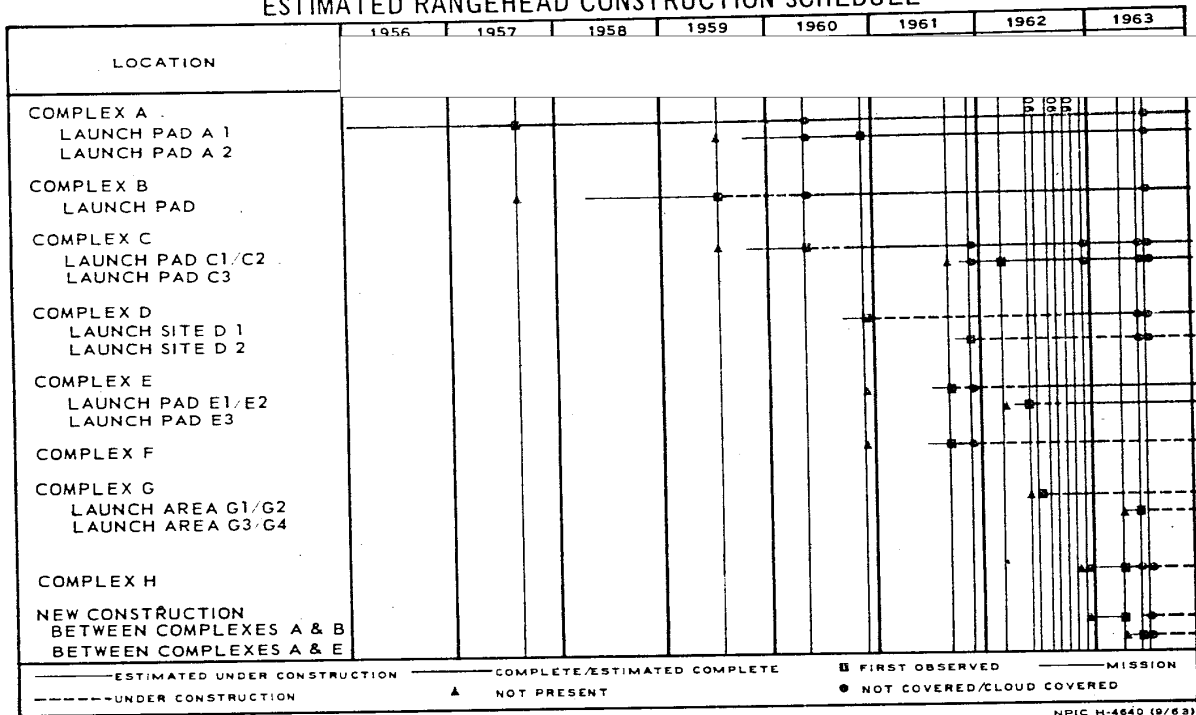


FIGURE 2. TYURATAM MISSILE TEST RANGE CONSTRUCTION SCHEDULE.

sideration and firings to Kamchatka and the Pacific as a secondary consideration.

Notable recent changes at Launch Complex B are the construction of another rail-drive-in building (235 by 70 feet) and a large building (370 by 135 feet) which is at present only road served (see figure 5). Construction of the rail-drive-in building at the terminus of the wishbone configuration began in the summer of 1962. It was completed between April and June of 1963. The large road-served building is being constructed along the northeast fence line. This construction began between November 1962 and April 1963. When completed, this installation will be the third largest building in the rangehead

area, the two largest being at Complex A and Complex G. Construction of these new buildings indicates that Complex B definitely has not been abandoned as a launch site, but rather that some increased or new activity is intended for this facility. This new activity could be associated with a new space booster, new space vehicle, new upper stages for the old SS-6, or a combination thereof.

LAUNCH COMPLEX C

April 1963 photography (figures 6 and 7) shows that two canted buildings have been added on the east side of launch site C-2. Similar

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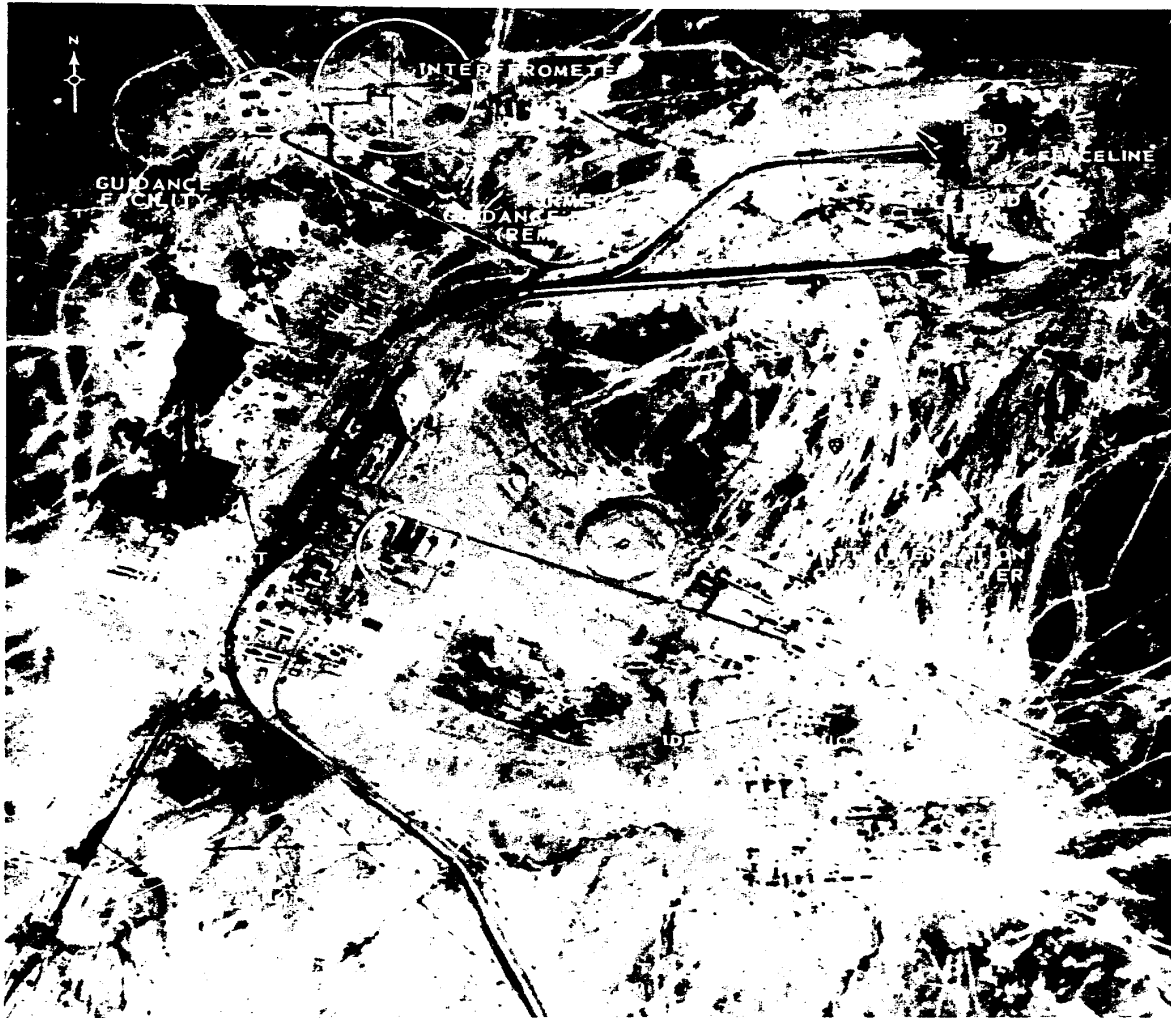


FIGURE 3. COMPLEX A, APRIL 1963.

canted structures have also appeared at the new-type SS-7 operational soft sites at Kostroma G, Perm D and E, Tekova D, Yurya I and J, Drovyanaya C and D, and Verkhnyaya Salda H and I (figure 8). The purpose of these structures is not clear, but they could possibly represent

relocated missile servicing facilities in environmental shelters close to the launch point. This modification of Complex C indicates a Soviet intent to test and possibly train with facilities similar to the latest operational configuration.

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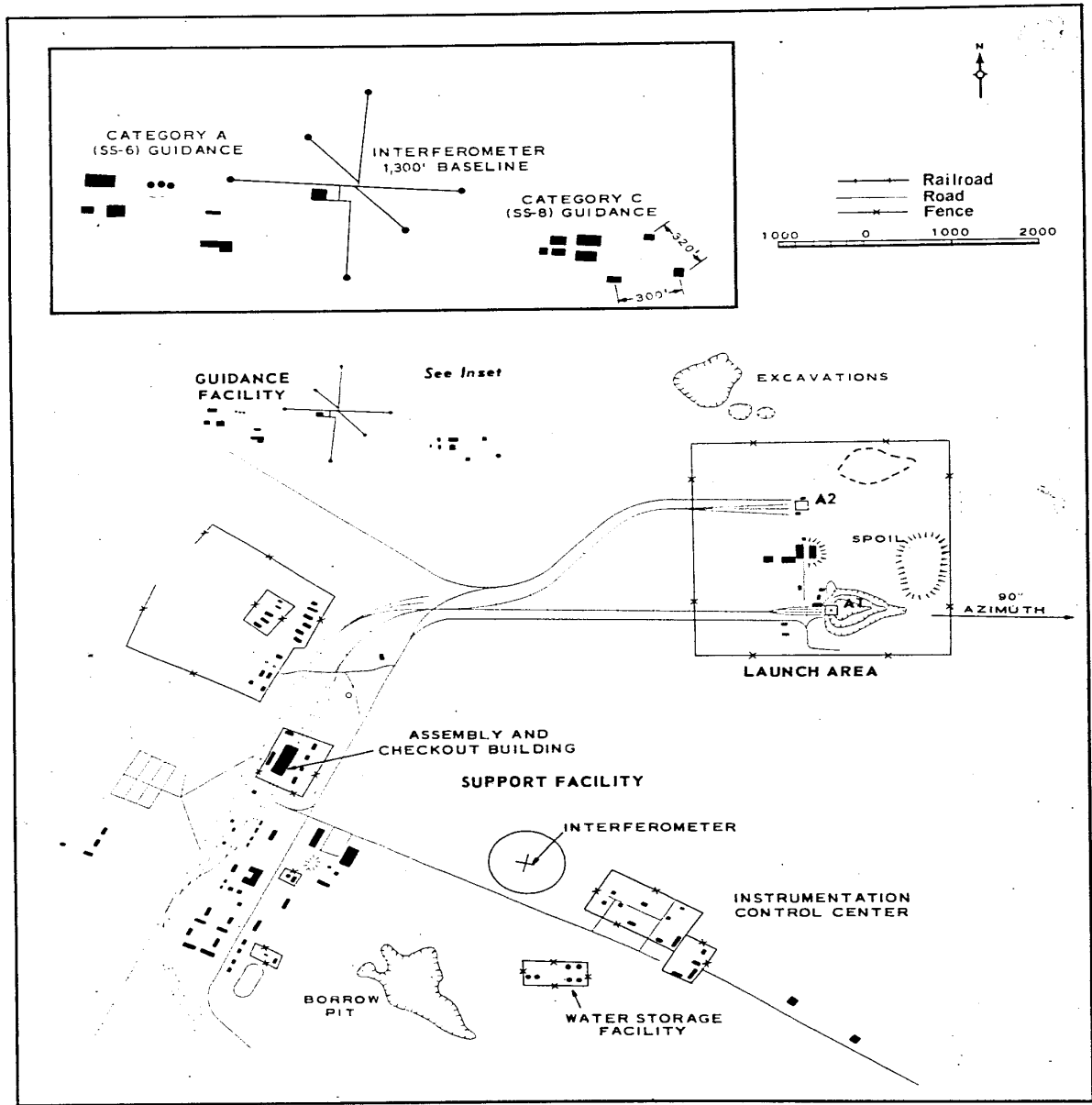


FIGURE 4. COMPLEX A, TYURATAM MISSILE TEST RANGE.

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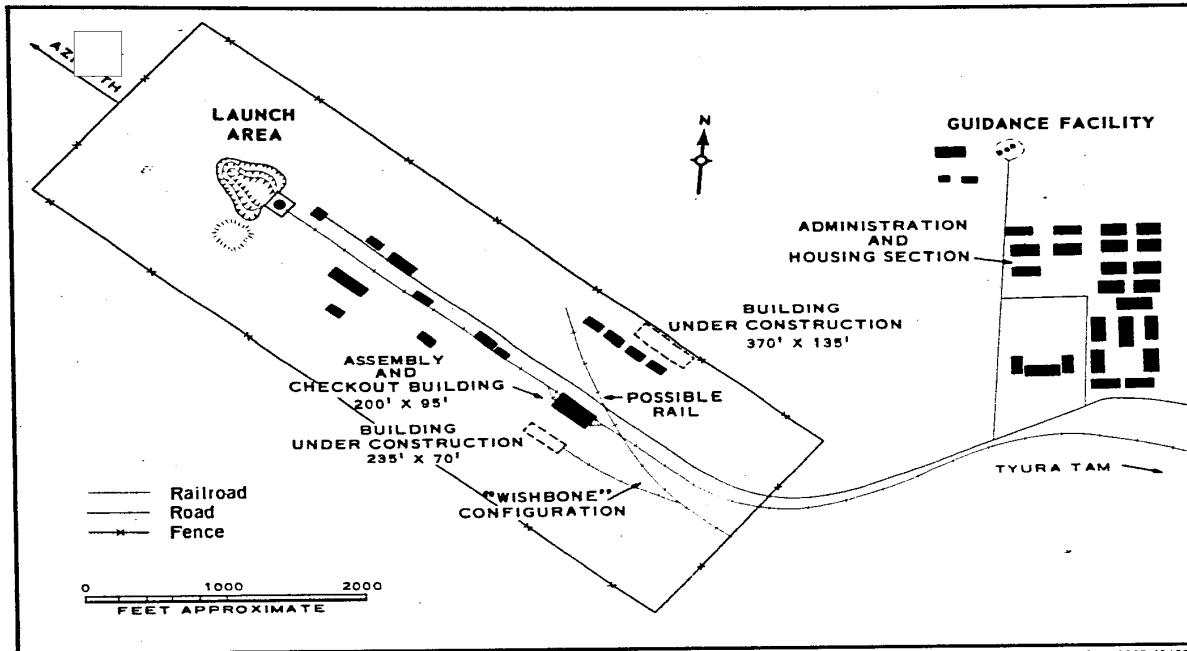


FIGURE 5. COMPLEX B, TYURATAM MISSILE TEST RANGE.

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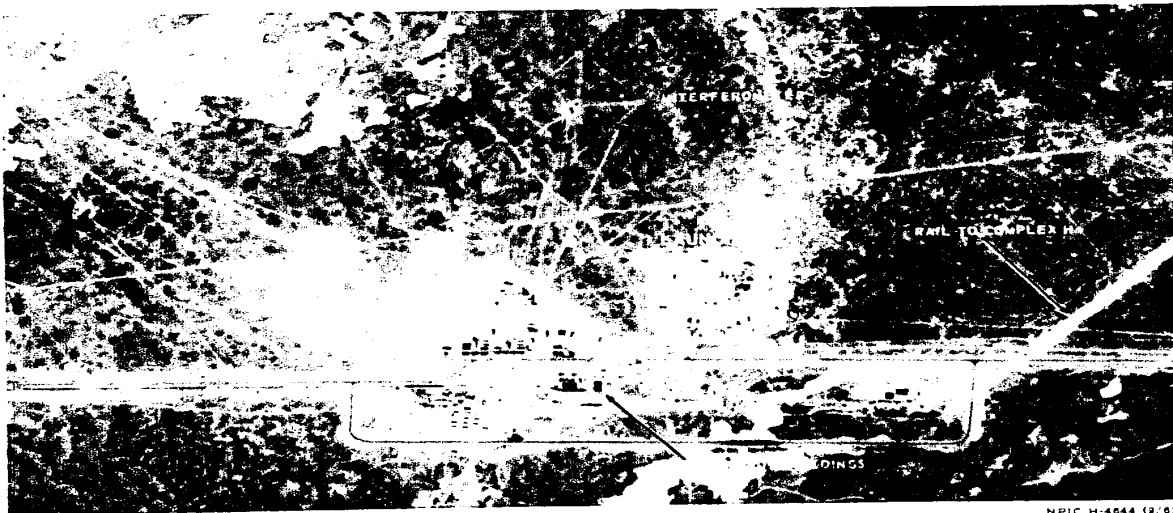


FIGURE 6. COMPLEX C, TYURATAM MISSILE TEST RANGE, APRIL 1963.

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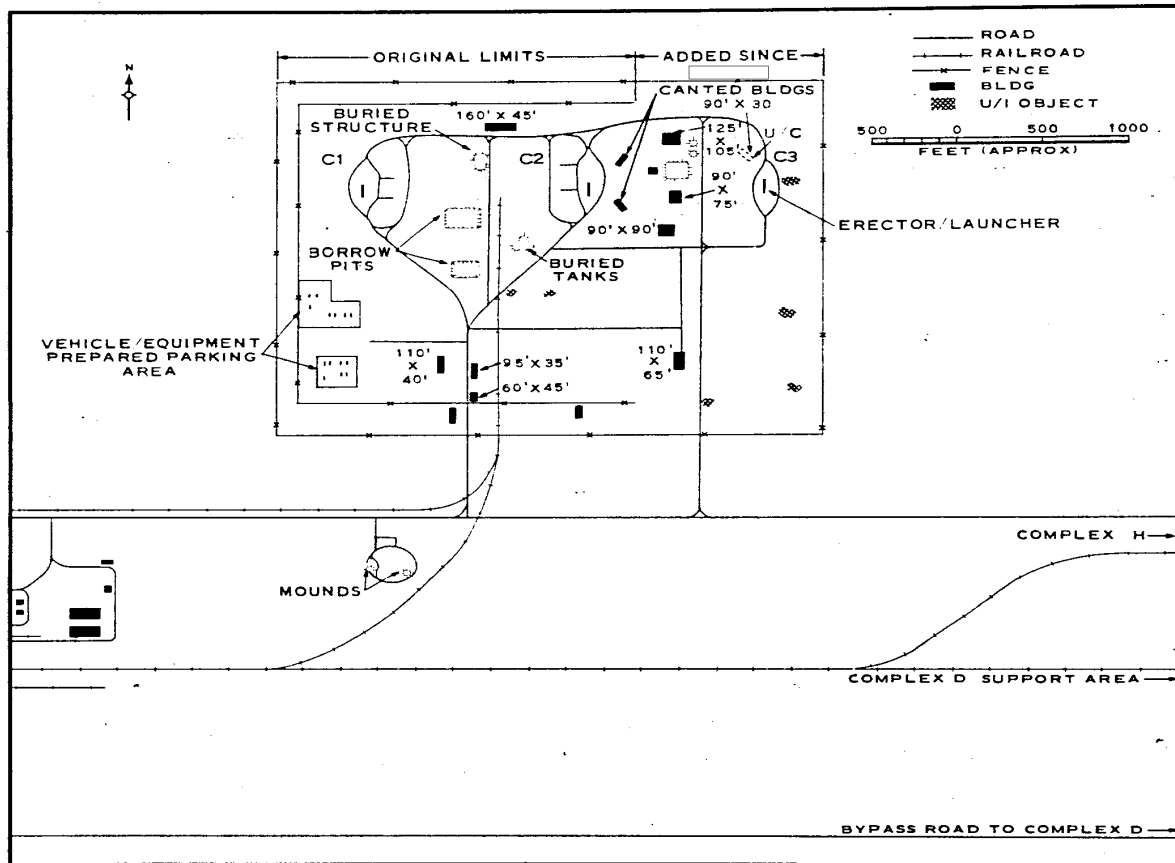


FIGURE 7. COMPLEX C, TYURATAM MISSILE TEST RANGE.

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LAUNCH COMPLEX D

Launch Complex D at Tyuratam is located at the eastern extremity of the rangehead area about 14 nautical miles from Complex C. It consists of two similar, separate hardened launch sites, D-1 and D-2, each containing three silos. Site D-1 was first detected while in the initial stages of construction in December 1960 and was completed in the fall of 1962 (see figure 9). Launch site D-2 is located approximately

4,100 feet east of D-1. Construction began sometime in October or November 1961, and as of July 1963, it is in the mid or late stages of construction (see figure 10). The entire Complex is road served, and since no significant support base is yet apparent within the immediate vicinity, such services are believed to be located in the enlarged support area just south of Complex C, about 14 nautical miles to the west.

Site D-1, as it appeared on April 1963 photography, represents a typical "signature" of

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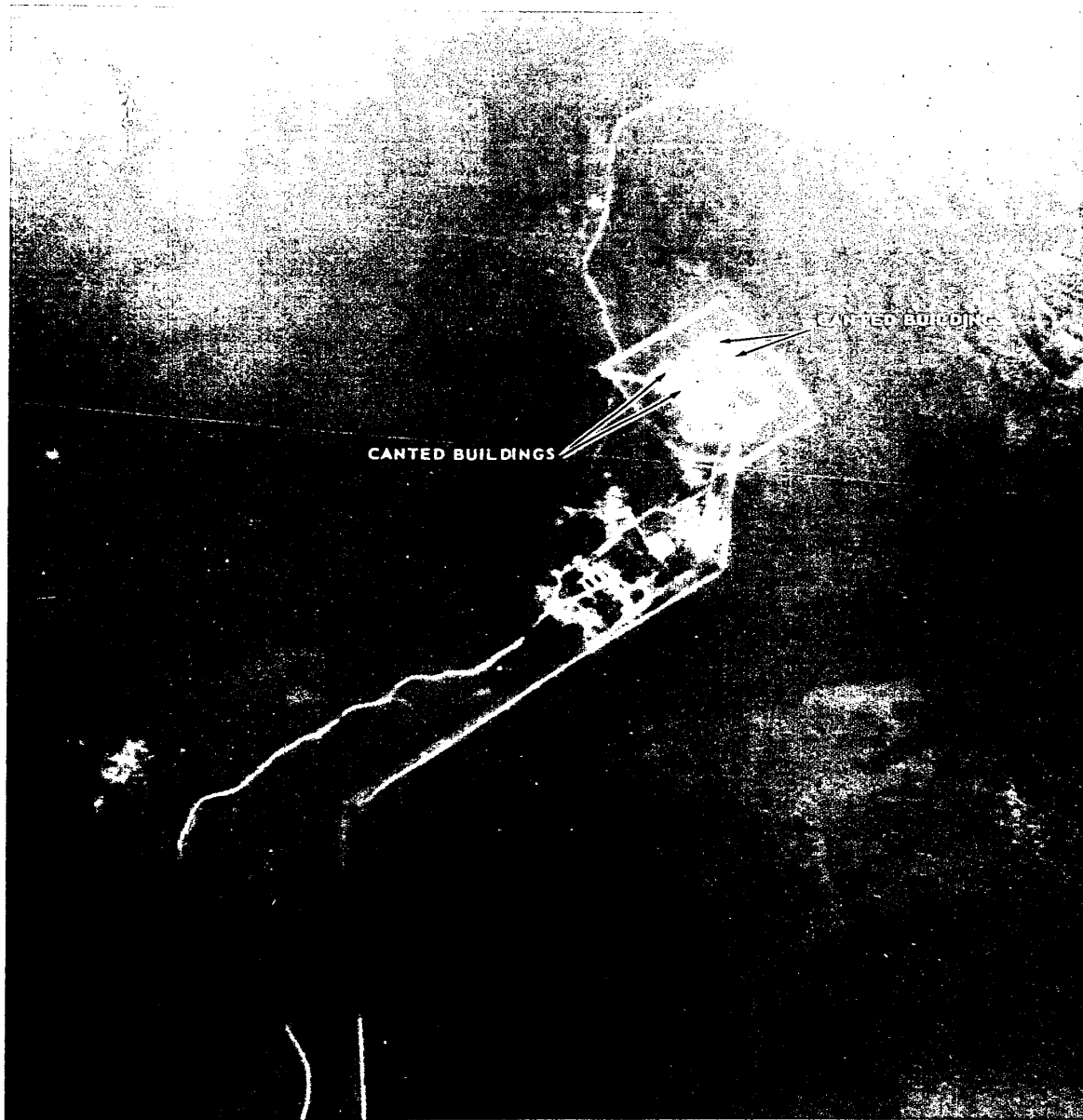


FIGURE 8. NEW TYPE SS-7 OPERATIONAL SOFT SITE.

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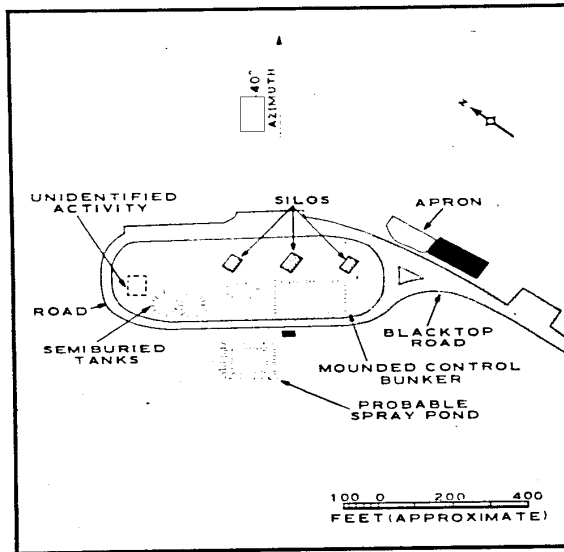
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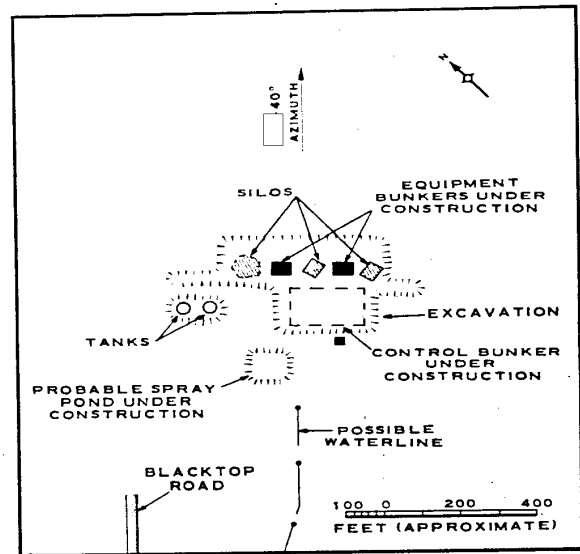
FIGURE 9. LAUNCH SITE D-1, TYURATAM MISSILE TEST RANGE, APRIL 1963.

the basically completed hardened-mode launch site for the SS-7 ICBM. As of July 1963, 19 such sites have been detected in various stages of construction at 11 ICBM deployment complexes scattered across the Soviet Union.* The most significant features of the site are the three silos, each capped by large covers approximately 40 by 80 feet which are canted at 45 degrees to the long axis of the site, a large underground bunker (about 180 by 110 feet) located on the uprange side of the silos, and a loop road surrounding the bunker and silos.

In April 1963, the excavation at Site D-2 had not yet been back-filled. Two of the silos appeared to be identical but the third (left silo as seen from the control bunker) appeared less distinct. The two terminal bunkers between the silos in the large excavation and the control bun-

*Three sites each at Yurya and Shadrinsk; two each at Verkhnyaya Salda, Novosibirsk, Yedrovo and Olovyannaya; and one each at Kostroma, Plesetsk, Perm, Drovyanaya, and Gladkaya.

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FIGURE 10. LAUNCH SITE D-2, TYURATAM MISSILE TEST RANGE, APRIL 1963.

ker in the characteristic "notch" excavation were clearly defined. The good quality photographic coverage of D-2 in April 1963 and of Olovyannaya A in July 1963 permitted the best measurement obtainable to date for the actual silo hole at an SS-7 hard site. The hole appears to be approximately 30 feet in diameter. Although the internal hole is circular, the external shape of these silos is square and canted at 45 degrees with respect to the long axis of the excavation. This orientation is retained in the alignment of the silo covers upon completion of the site such as is the case of D-1.

Frequent KEYHOLE coverage of Complex D and all similar deployment sites during construction have permitted development of a composite construction sequence and an average schedule for completion of the construction of a typical SS-7 hard launch site (see figure 11).

The site is first identified by a rectangular excavation with a notch along one of the long

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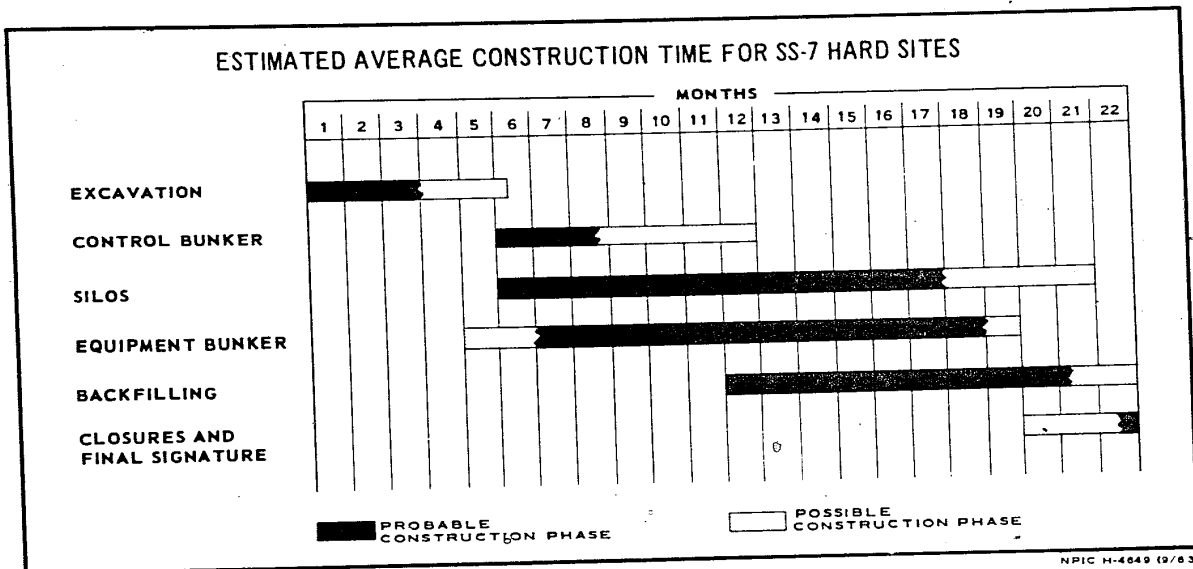


FIGURE 11. CONSTRUCTION SCHEDULE FOR SS-7 HARD SITES.

sides (uprange side). Subsequently, three silos and two terminal bunkers and a probable inter-connecting tunnel appear in the excavation, and a large bunker (probably the control bunker) appears in the notch (figure 12). (The third silo, when it can be detected during the mid-stage of construction, initially presents a different appearance from the other two silos; this difference will be discussed later in this report.) Finally, the excavation is backfilled to cover the bunkers, the large control bunker is earth mounded over, and the three silos are capped with large (40 by 80 feet) covers canted at 45 degrees to the long axis of the site (figure 13). A service road loops around the control bunker and the three silos. The final configurations of D-1 at Tyuratam and the completed SS-7 hardened deployment sites appear almost identical.

The average construction time for an SS-7 hard launch site is about 21 months (± 1 month). This estimate is based on a rather intensive analysis of construction progress at the various

hard sites. Although no single site was covered regularly by good quality photography, an aggregate total of nearly 100 coverages provided a good sample rate. The 21-month construction period compares favorably to the 22-month period required for construction of the Titan II missile launch sites and a 24-month period required for the Titan I missile launch sites in the United States.

The lack of satisfactory continuity of good quality coverage for any individual site leaves the evidence available to date somewhat inconclusive with respect to whether only two or all three silos are launch silos. Previous estimates of the SS-7 hard launch site configuration were based on the data from KEYHOLE missions (October 1962). At that time, the launch site was thought to be comprised of three primary structures--a control bunker and two silos. Subsequent good to excellent quality photography has permitted the positive identification of additional structures which include a

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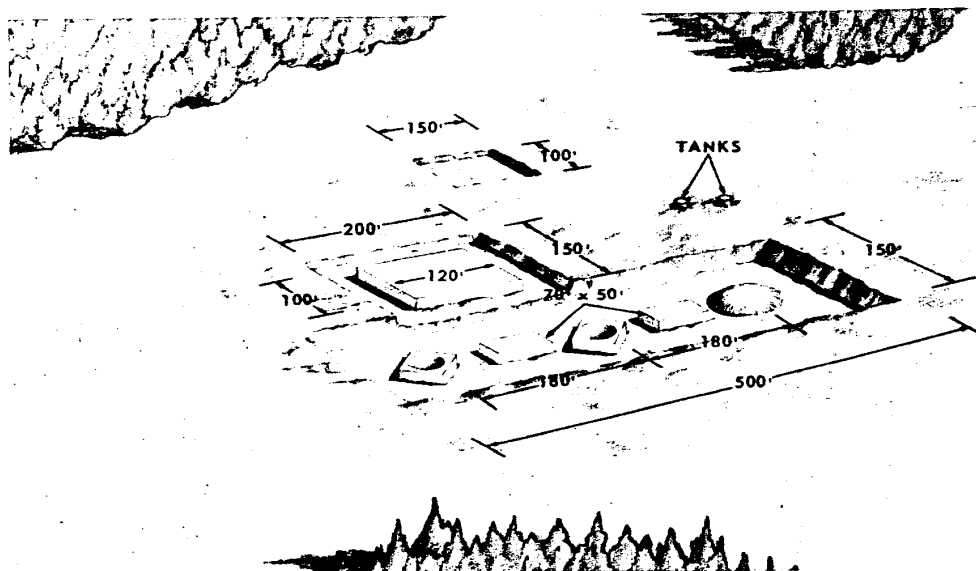


FIGURE 12. SS-7 HARD SITE IN MID-STAGE OF CONSTRUCTION.

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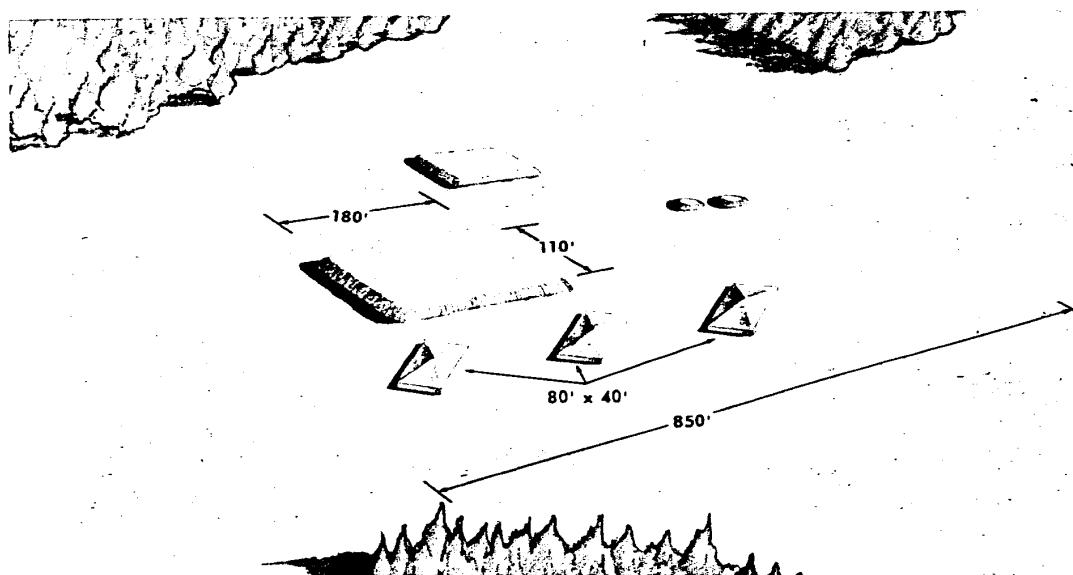


FIGURE 13. SS-7 HARD SITE COMPLETED.

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third silo, two terminal bunkers, and an inter-connecting tunnel. The third silo (which is in the same relative position in every case) consistently appears somewhat later in the construction cycle than the other two. Although it appears to differ from the other two during the early and mid-stages of construction, it appears identical during the final stages. After site completion, all silo covers also appear identical. The observations during the early and mid-stage of construction suggest that the left silo (third silo) may serve a purpose other than launch. In addition, the presence of two instead of three terminal bunkers suggests a pair of launchers and an auxiliary silo. Also supporting the above conclusion is the fact that at all of the SS-7 hard launch sites the control bunker appears to be centered on the terminal bunkers and the right pair of silos, or in other words, not centered on the complex of the five structures. (The technical reasons for such an alignment in either case are not obvious.) Finally the generic relationship of the SS-5 and SS-7 together with the configuration of the MRBM/IRBM silo launch sites (which exhibits an asymmetrical third silo that tentatively has been identified as a portal silo) suggests that the left silo at the SS-7 hard launch sites may serve a similar function.

Alternatively, the postulation of a structural pattern of three launch silos in the case of the MRBM/IRBM silo sites and three launch silos in the case of the SS-7 hard sites is supported by the fact that the closures appear quite similar on completion of construction at both sites. All three are identical in size (40 by 80 feet) at the SS-7 sites and very close to the same size at the MRBM/IRBM sites (45 by 45 feet at two of the silos and 40 by 50 feet at the third). This proposition is strongly supported by the fact that in

July 1963 coverage of Olovyanaya A in the late mid-stage of construction shows three silos that appear identical prior to the completion of backfilling and the installation of the covers (figure 14). Another possible indicator that all three silos are similar is the appearance during the late mid-stage of construction of three objects, approximately 30 by 100 feet, one in the vicinity of each silo. These objects seem to disappear one by one as construction progresses and are not apparent upon site completion. Ground scarring which would indicate the burying of these objects has not been observed. These objects appear to be the correct size and disappear at the proper time to be sleeves or liners for the silos. If they are, they would indicate that all three silos are of the same depth and probably identical.

Some of the arguments relating to the third silo question at the SS-7 hard sites raise technical implications. The suggestion that the third, left-hand silo does not appear as early or as clearly as the center and the right-hand silos is explainable in either of two ways. The first is

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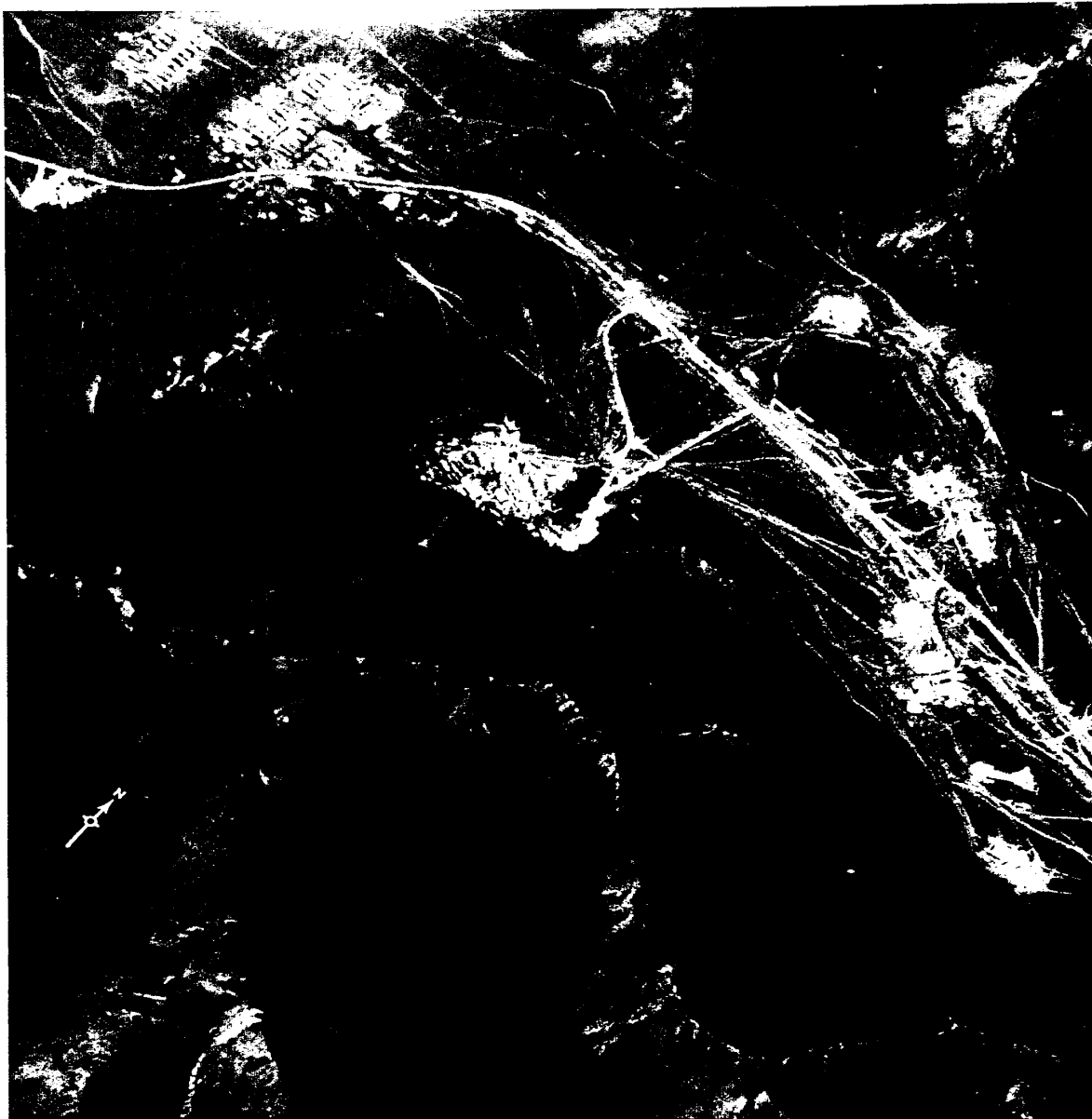
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FIGURE 14. SS-7 HARD SITE LATE STAGE OF CONSTRUCTION, OLOVYANNAYA LAUNCH AREA A, JULY 1963.

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that the left-hand silo is started third in the construction sequence and consequently takes on a definable shape only in the latter part of the construction cycle after the right and center have already been stripped of forms and are, therefore, more easily identified on good quality photography. The second explanation is that the left-hand silo is started at the same time or later than the other two but is somehow configured differently internally and hence requires a different construction technique. However, for reasons of construction standardization the external appearance in its upper portion is identical to the center and right silos.

It is not possible at this time to determine whether either of these explanations is correct. A sequence of construction and related external appearances similar to those noted in the first argument has been observed at Titan I operational sites. Furthermore, the second explanation requires that a rational premise be made regarding the third silo's purpose. For this discussion, the functions of a power house and alternatively a propellant terminal are assumed; other assumptions are no doubt possible. Based on a wall thickness of [] (silos), it is believed that the internal dimensions of the structure are probably no greater than 40 by 40 feet in plan and might contain as many as three work levels if the structure does not extend below the bottom of the main excavation. Such a structural configuration is far from ideal for a power house installation with equipment stacked in levels. This is especially true from the standpoint of access for major equipment removal as well as from the standpoint of weapons effect ground shock isolation provisions. The structural geometry might be suitable for a propellant terminal, but its asymmetric location with respect to the center and right silos is extremely unfavorable because of the excessive pipe runs. Although it is probably possible to

package a portion or all of the site utilities systems into the left-hand silo, it does not appear efficient or desirable. After reviewing all of the available photographic coverage of the SS-7 hard launch sites as well as the possible uses that might be considered for the third silo, it appears, although not conclusively so, that the third silo is probably also a missile-launching silo.

In reviewing the photographic coverage of Complex D at Tyuratam and selected similar deployed sites, consideration was given to determining the basic launching technique. A previous report, based on the then available silo dimensions (75 feet in diameter), noted that the SS-7 silo launchers could be either the silo-lift or flyout type. The most recent dimensions based on good to excellent quality KEYHOLE photography are 55 feet square with a circular opening approximately 30 feet in diameter which is visible during the mid-stages of construction. If the SS-7 silos are assumed to have walls as

for the upper 30 feet of the silo), then 15 to 20 feet must be deducted from the 55-foot square to obtain the interior dimensions below the silo mouth. On this basis the SS-7 silos have a useable interior diameter of 40 feet []

[] These values are not inconsistent with the 30-foot diameter opening observed in the silo during the final stages of construction and with the 40-foot closure width. If these estimates (30-foot minimum and 40-foot maximum silo inside diameter) are correct, then it is improbable that a flyout launcher of the Titan II type could be incorporated with the SS-7 silos. For comparison purposes, the inside diameter of the Titan II flyout silo is 55 feet while the Titan I elevator silo is 40 feet. Also, prior to the

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selection of the Titan II silo diameter, a number of detailed studies were carried out by the Titan associate contractors to determine the feasibility of designing a Titan II flyout launcher which could be fitted into the 40-foot-diameter Titan I silos. The results of these studies indicated that such an approach was not feasible. It would appear, therefore, based on silodiameter alone and assuming that the 30- to 40-foot inside diameter is correct, that the SS-7 silo launchers are possibly limited to the elevator type. However, before a definitive answer is obtained, other factors such as power requirements for the elevator drive, the silo depth, and the closure configuration, as well as other launch techniques (for example, that used with the Minuteman) which are beyond the scope of this report, must be considered.

In the analysis of the two SS-7 hard launch sites at Complex D, the problem of determining hardness level was also studied. Such factors as dimensions of the hard launch site structures, their separation distances, and the configuration and dimensions of the silo closures were ana-

25X1 [REDACTED] detailed discussion, see appendix B to this report). However, no definite conclusions regarding the hardness level of these sites can be reached on the basis of available information. Certain factors suggest that the SS-7 hard sites could be designed for hardnesses of 100 to 300 psi, whereas others tend to indicate its hardness would be 100 psi or less. Solution of this problem may be feasible, however, with more study of available material and if future photographic coverage of a SS-7 hard site could be acquired that would reveal the mode of operation for the silo closures.

Finally, there is the question of why two such similar or identical launch sites as D-1 and D-2 are required at a research and develop-

ment missile rangehead. Superficially, such an arrangement appears to be redundant and costly. Perhaps the second site supports the operational training program and/or serves as a back-up facility in the event of a catastrophic accident that would disable one of the launch facilities. It is also possible that, although the two launch sites at present appear to be similar, they may vary considerably in their internal characteristics. A solution to this question obviously cannot be derived solely from the analysis of available photographic data.

Although reloading the operational silos for a refire capability would probably take many hours, nothing was observed about the facilities that would preclude such an operation; and the support facilities associated with the complexes were certainly adequate for storing extra missiles.

LAUNCH COMPLEX E

Launch Complex E at Tyuratam, covered fairly consistently by KEYHOLE photography since September 1961 [REDACTED] has been described in detail based on [REDACTED] photography [REDACTED]. The improved quality of the photography obtained during April 1963 [REDACTED] and June 1963 [REDACTED] has permitted more detailed analysis of the rangehead facilities and a resulting reappraisal of some of the characteristics of this Launch Complex.

Launch Complex E was first observed on [REDACTED] although data obtained previously on [REDACTED] had revealed construction underway on the main road leading northwest from the original Tyuratam rangehead complex. When first observed, ground clearing and construction of several buildings were underway. Complex E was observed again in March 1962 [REDACTED]

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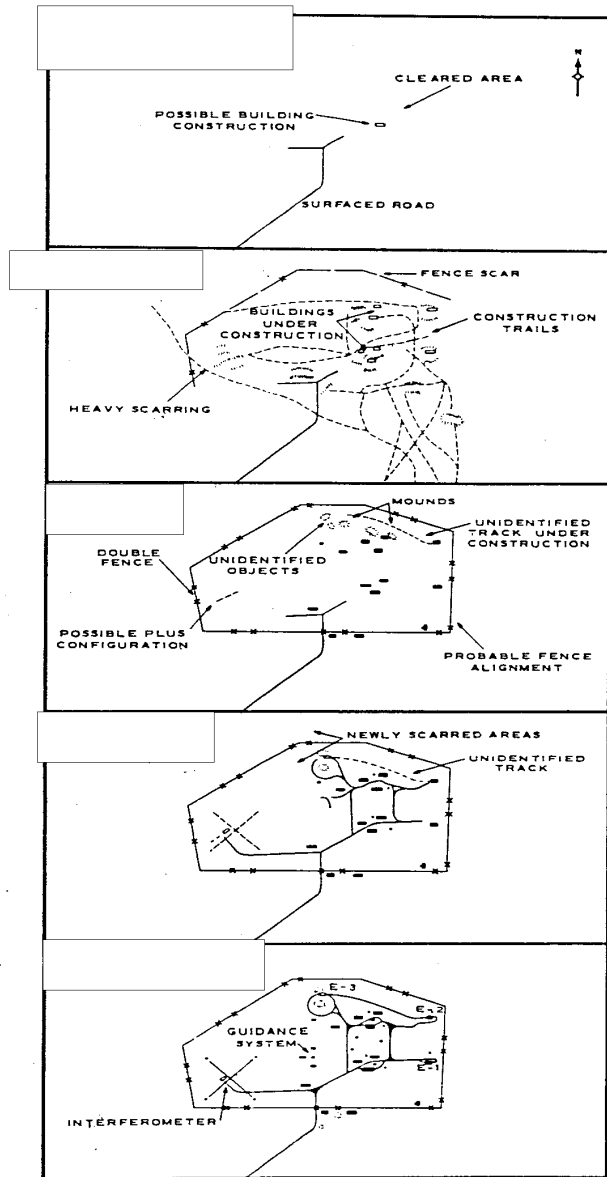


FIGURE 15. DEVELOPMENT SEQUENCE OF LAUNCH COMPLEX E, TYURATAM MISSILE TEST RANGE.

and considerable construction activity was noted although the poor quality of the photography precluded qualitative readout. Heavy scarring was noted in the west end of the area now occupied by the 1200-foot interferometer. By June 1962

the Complex appeared as a secured irregularly shaped area measuring 4,500 by 2,900 feet and containing 14 buildings. New construction was noted on the north side of the complex adjacent to the security fence. October 1962 photography revealed that although construction was continuing, it could probably have supported missile launchings during the summer (as was indicated by FLIM FLAM data SS-8 launch). The excellent quality of the coverage obtained in April 1963 and June 1963 revealed additional details. Development of the Complex is shown in the series of line drawings presented in figure 15.

Launch Complex E in its present form consists primarily of three probable launch pads, a possible guidance facility, 15 major buildings, and an interferometer (see figures 16 and 17). The Complex is apparently an autonomous facility with no separate support area associated with it. At the extreme eastern end of this Complex are two buildings measuring approximately 140 by 70 feet and separated from each other by a distance of 800 feet. North of each building and connected to it by a possible pipe or cable conduit is a small unidentified object.

Approximately 800 feet west (up range) of these buildings are two clusters of three buildings, each surrounding a probable launch pad. Due to the proximity of the buildings, the exact shape of this encircled pad is not discernible. However, the spacings of these buildings suggest that the overall measurements could be of the order of 150 by 150 feet. In the center of each of these pads is an irregular dark area about 65 feet across. Two poles, possibly for

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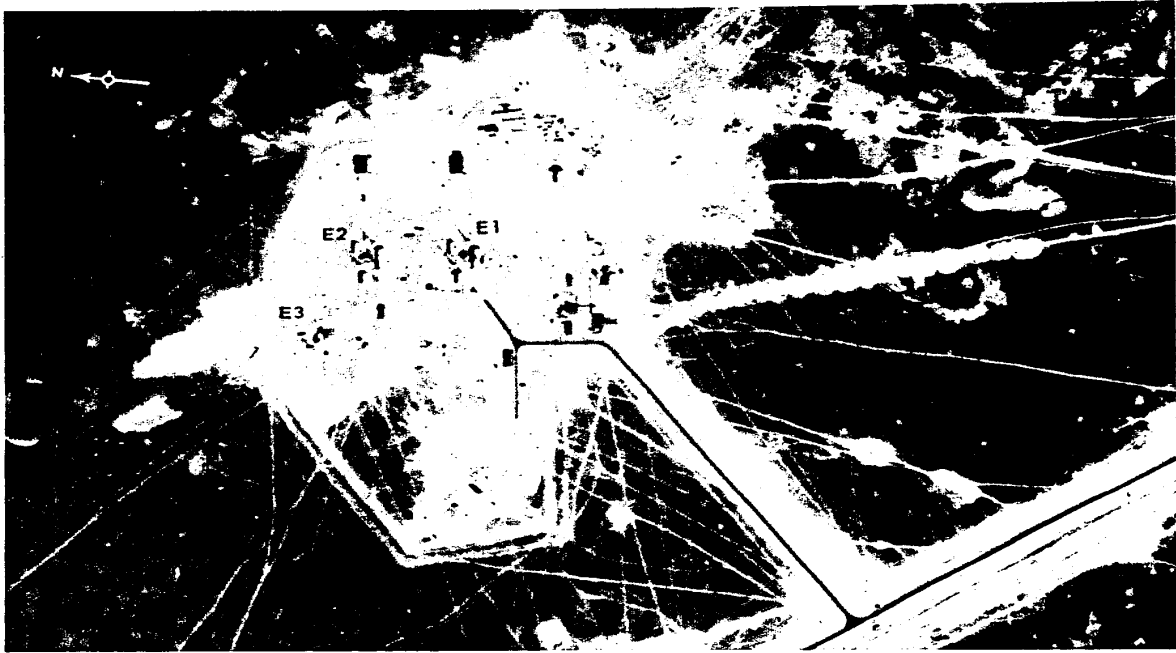


FIGURE 16. LAUNCH COMPLEX E, TYURATAM MISSILE TEST RANGE, APRIL 1963.

illumination, are located on each side of each pad. These areas have been designated launch pads E-1 and E-2 as indicated in figure 17. The buildings surrounding these pads measure 185 by 55 feet, 95 by 40 feet, and 100 by 35 feet with the two larger buildings abutting the pad itself and thus possibly located as close as 75 feet to any missile being fired from these pads.

A third launch position, designated E-3, is located 1,000 feet northwest of E-2 adjacent to the security fence in the area marked by heavy ground scarring and construction activity in June 1962. This launcher, connected to the other areas by a paved, curved road, consists of an almost circular road surrounding a mounded structure which now occupies the area of an excavation seen in June

1962. On the north side of the circle road is a square pad approximately 150 feet across with a heavily revetted or mounded structure on the north side and a mounded smaller structure on the south side. The mounding obscures the exact measurements of these structures, although in relative size, shape, and position, these are similar to the buildings measuring 50 by 50 and 25 by 50 feet observed at pad A-2. Two poles are positioned on opposite sides of the pads on the same manner as at E-1 and E-2. A trace is observed connecting to the north 150- by 70-foot building.

Immediately to the west of pad E-1 and south of E-3 are four square-appearing objects that form a triangle (see figure 17). The sides of the triangle measure about 230 feet. The legs are

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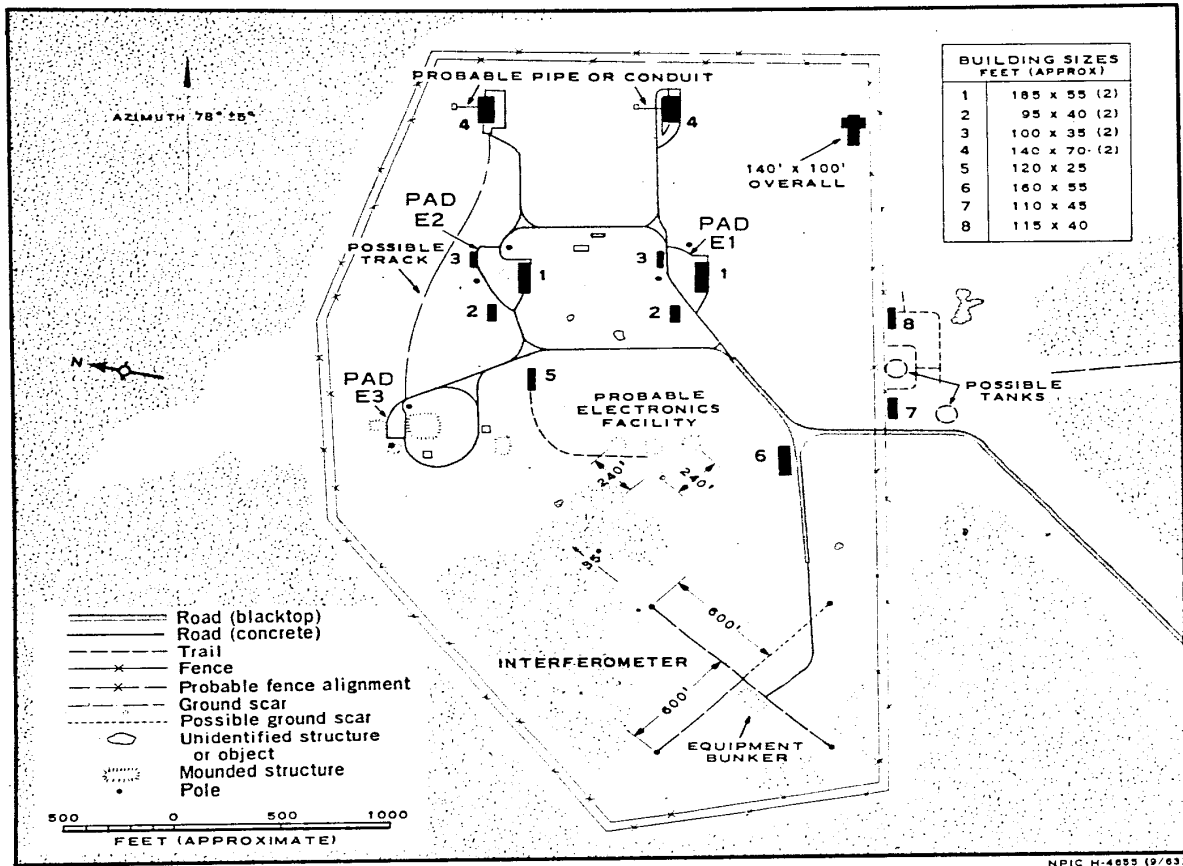


FIGURE 17. COMPLEX E, TYURATAM MISSILE TEST RANGE.

At the extreme western end of the fenced area is a cruciform interferometer with base-lines of approximately 1,200 feet. Objects are noted at the extremities of the cruciform ground scars and additional objects are present closer to the center station which could be additional receivers for ambiguity resolution. The legs of the interferometer are on 35/215-degree and

125/305-degree orientations. The orientation of the entire complex, that is, of all major structures and of the general road pattern, is along

Outside the security fence near the access road are two possible tanks and two structures. The functions of this portion of the facility as well as of a T-shaped structure in the southeast corner of the secured area are unknown.

The excellent quality of the data obtained in April 1963 has permitted analysis

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which indicates that reassessment of the function of some of the elements at Complex E is in order. It was noted from this mission that the A-2 launch pad at Tyuratam was not octagonal as previously assumed but square, measuring 150 feet on a side and flanked by two structures, one measuring 50 by 50 feet and the other 25 by 50 feet, with the separation distance between being approximately 165 feet. A dark spot is observed in the center of the pad (see figure 4). Returning to Complex E, it is observed that the buildings at E-1 and E-2 are separated by 165 feet; and while the exact dimensions of the pads between the buildings is obscured, they appear to be square, obviously fit within 165-foot distances, and each has a dark spot in the center. At E-3, there is a square area 150 feet on a side and flanked by two buried structures. While exact measurements are not available due to mounding, it is clear that the structure on the south side is larger than that on the north side and the separation distance is 165 feet--again the same arrangement and separation distance that exists at pad A-2.

Based on these similarities of pad size, shape, darkened areas, the separation distances, and the fact that FLIM FLAM has indicated SS-8 firings from Complex E, it is concluded that three separate launch facilities are present in Complex E. The anomaly of the two buildings abutting the pads at both E-1 and E-2 might possibly be explained by the use of these areas primarily for prelaunch operational checkout training--such as missile handling, erection, checkout, and perhaps fueling--in which case the prelaunch support equipment has been located above ground for convenience. Although the nature of the construction of the buildings at E-1 and E-2 is not apparent from photography, they evidently must be of a type that will withstand the induced environment from an ICBM launch 75 to 80 feet away from a flat pad. Since FLIM FLAM data

indicate an SS-8 firing from Complex E as early as [REDACTED] the firing must have occurred from either E-1 or E-2. There was no evidence of construction activity in the E-3 area [REDACTED]

[REDACTED] while only of fair quality, indicates that E-3 could not have been ready in 2 weeks to support a firing [REDACTED]

Comparison of the E-3 area with deployed SS-8 soft sites gives the first concrete evidence of a relationship between the two. On the basis of similarities derived, it is concluded that the E-3 area is the prototype of these deployed sites. Looking at E-3 in figure 16, it can be seen that if the square pad and the two opposing buried structures had been seen in the early stages of construction, when only the foundations for the structures were evident, the area including pad and structures would have had a "winged" appearance. This is a characteristic of the observed ICBM launch sites seen at Tyumen, Gladkaya*, Kozelsk, and Plesetsk D and E. Also, the later coverage of these deployed sites has revealed the development of a circular road pattern as shown in figure 18. Further similarities between E-3 and an SS-8 soft site are shown in figure 19. Note especially the "plus sign" ground scar patterns at the rear of each complex.

The SS-8 soft sites were first discovered at Tyumen [REDACTED] (April 1962). First activity in this area, in retrospect, was seen on [REDACTED] (December 1961). Similar complexes were discovered at Gladkaya on [REDACTED]

[REDACTED] (June 1962), at Kozelsk on [REDACTED] and at Plesetsk on [REDACTED]

[REDACTED] Unfortunately, photography has never been of sufficient quality to show the fine details at any SS-8 soft site. However, in general, the launch complexes are comprised of two ready buildings (approximately 130 by 115 feet)

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FIGURE 18. SS-8 SOFT DEPLOYMENT SITE.

800 feet behind the two road served probable launch areas. The separation distance between pads is also 800 feet. One distinguishing feature is a "winged" appearance of the construction in the area of the suspect launcher. A second characteristic is a "plus sign" ground scar pattern to the rear of each complex. The "plus sign" ground scars appear to be arranged to form a triangle with the long side coinciding with the loading axis of the complex and with one leg

oriented within the operational launch sector. Orientation of the main complex appears to be selected at 45 degrees from the center of the operational launch sector.

These facts suggest that the "plus" configuration seen at Tyuratam A-2 (December 1960, see figure 4), at Complex E (April 1963, see figure 17), and behind the SS-8 soft operational sites could be a radio guidance system consisting of at least one control building and a probable L-shaped interferometer with a 250- to 300-foot baseline. Preferred direction of fire would then appear to be along one leg of the interferometer and 45 degrees from the loading axis of the launch pad. It might be noted that this direction of fire is supported by the modification of the Gladkaya A and B SS-8 soft launch sites in favor of SS-7 soft sites that are on an azimuth oriented 45 degrees from the original SS-8 installations. This is consistent since, in most cases, SS-7 soft sites are oriented approximately along the center of the operational launch sector.

Cruciform interferometers with a 1,200-

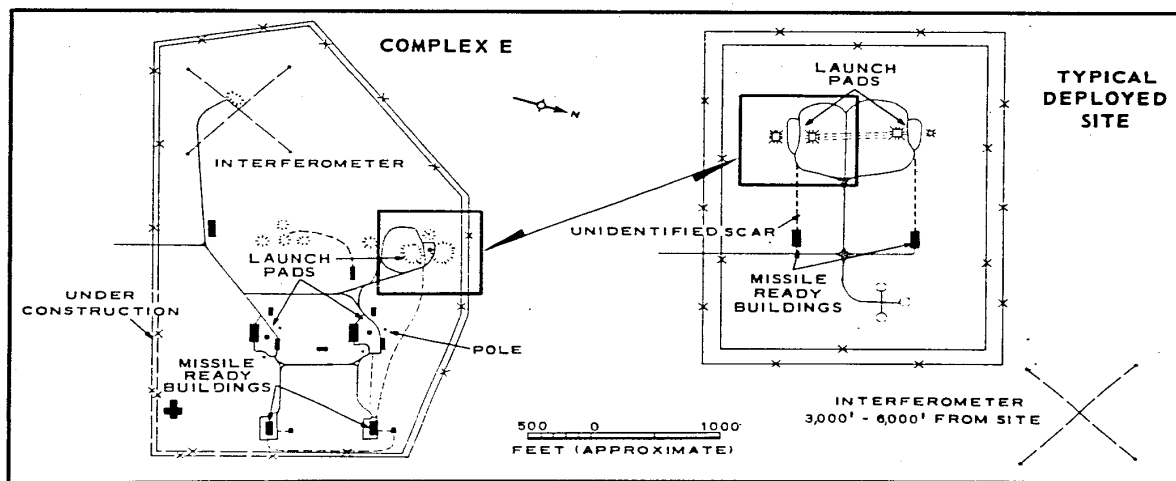


FIGURE 19. COMPARISON OF SS-8 OPERATIONAL SOFT SITE AND E-3, TYURATAM MISSILE TEST RANGE.

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foot baseline are seen at Tyuratam Complex E and in the electronics area behind Complex A-2 and are oriented with one leg approximately along the range line. Such an installation could serve as the ground installation for the radio guidance system of the SS-8 missile system, now associated with Tyuratam launch pad A-2 and Complex E by virtue of FLIM FLAM analysis and with the SS-8 operational soft sites by facilities analysis. Identical interferometers are under construction at Tyumen A and C at Plesetsk D and E. While these installations were identified from the excellent quality coverage in April and June 1963 respectively, in retrospect it is possible to observe initial construction of the interferometer at Plesetsk in May 1962 []

[] Orientation is apparently such as to place one leg of the cruciform along the center of the operational launch sector (figures 20 and 21).

The timing of construction (or appearance in photography) of the "plus" configuration (or triad) and the 1,200-foot baseline cruciform interferometer is peculiar and so far not understood. At Tyuratam A-2, the triad was evident in December 1960 in time to support the start of the SS-8 flight program in April 1961; the interferometer was not evident until May 1962 []

[] although firm evidence of ground scarring for the interferometer was evident in February 1962 [] and possibly as early as September 1961 [] The triad at Complex E was in evidence in October 1962 [] coverage prior to this time was not of sufficient quality to permit identification. At the SS-8 deployed soft sites, one of the first identifying characteristics seen was the "plus" configuration (triad) ground scarring. The interferometer, on the other hand, was not observed until May 1962 at Plesetsk and April 1963 at Tyumen and has not yet been seen at some of the remaining SS-8 soft sites. A comparison of the construction schedules for all of these

areas is shown in figure 22, from which it can be seen that there is a possible consistency in the appearance of the 1,200-foot interferometer--some time after the first quarter of 1962. The triad is always evident in the early stages of construction, except for Complex E where there is insufficient quality of coverage for readout of this type of installation. One possible explanation is that the triad short baseline concept was the original system used to start the program in 1961, and that the 1,200-foot system was established as a backup or secondary system after the first phase of the flight test program. Such a change is consistent with the observed performance of the SS-8 missile system, since analysis of FLIM FLAM indicates that the accuracy demonstrated to Kamchatka (3,400 nautical miles) is not particularly good and is, in fact, not significantly better than the all inertial system of the SS-7.

While the E-3 launch pad has been identified as a prototype of the SS-8 operational launcher, Complex E as a whole remains somewhat of an anomaly. The buildings surrounding E-1 and E-2 cannot be explained and are not apparent in any deployed site. Considering the entire launch complex as compared to the SS-8 operational sites, the placement of the launchers, checkout buildings, and guidance area (both relative to each other and to the research and development launch sector) appears to be reversed. However, considering the E-3 pad alone, the larger of the two adjacent structures is on the south side, the same side as at pad A-2. This suggests that the missiles are loaded from the same direction at both A-2 and E-3, thus indicating that, while other Complex E structures are reversed, the E-3 launcher is situated correctly for a Kamchatka/Pacific launch. On balance, there is sufficient evidence to indicate that Complex E is associated with soft sites of the type seen at Tyumen, Kozelsk, and Plesetsk D and E and in

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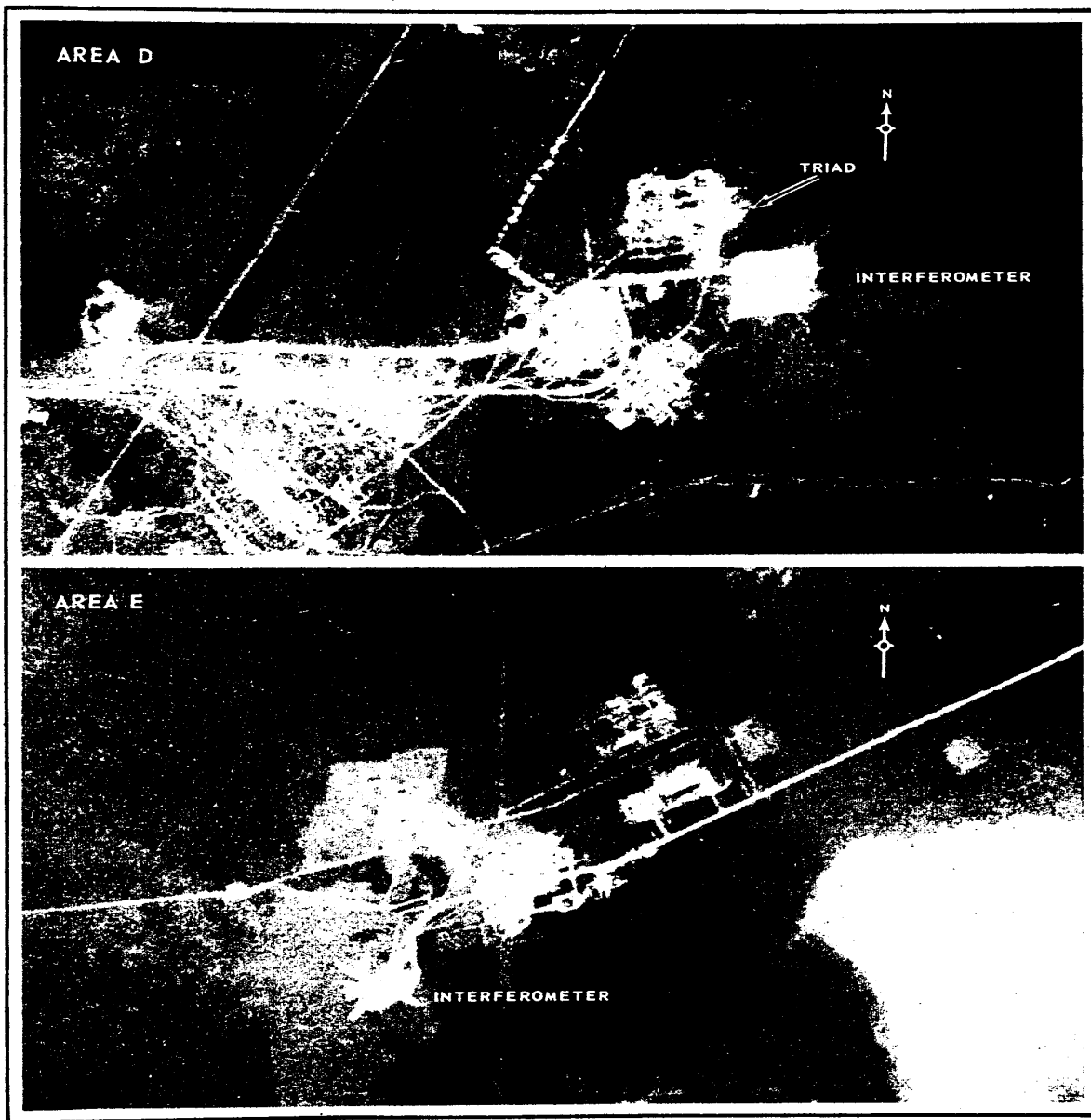


FIGURE 20. PLESETSK LAUNCH AREAS D AND E.

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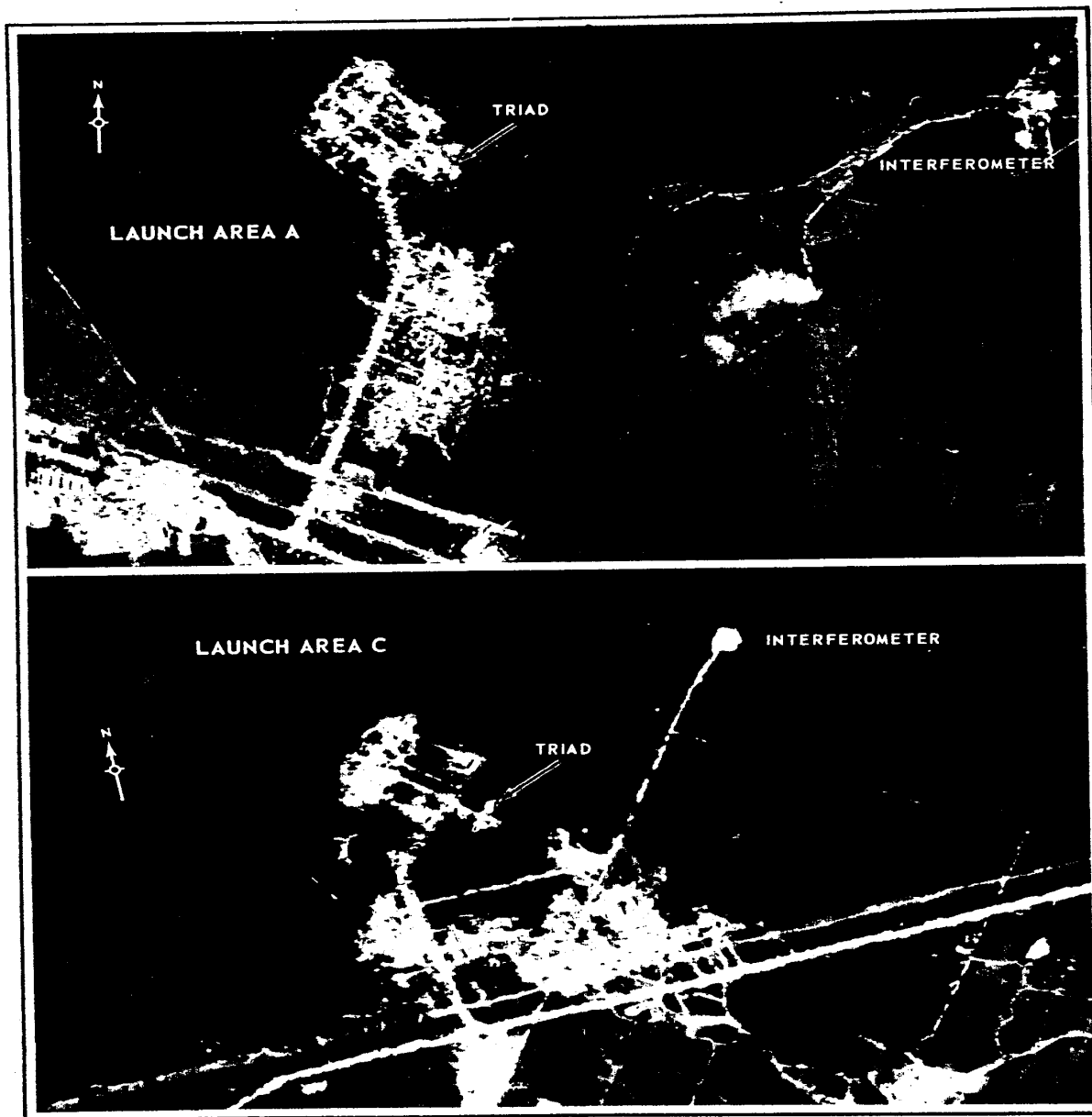


FIGURE 21. TYUMEN LAUNCH AREAS A AND C.

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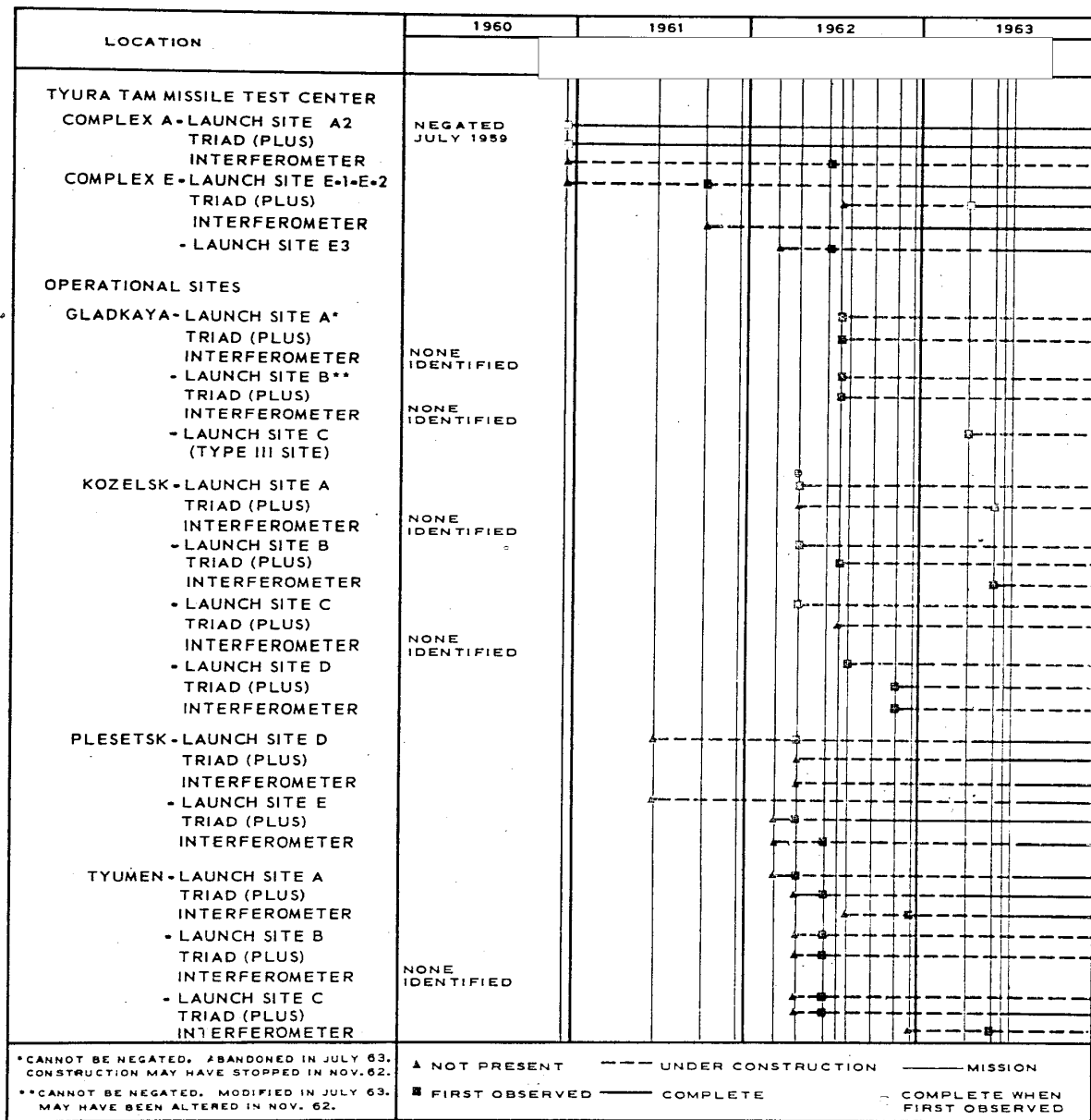


FIGURE 22. CONSTRUCTION SCHEDULE, COMPLEX E AND SS-8 OPERATIONAL SOFT SITES.

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part is the prototype for these SS-8 operational soft launch facilities, although the function of some of its elements and the reason for the orientation are not clear at this time.

It is difficult to estimate the completion time for the SS-8 deployed sites because of inconsistent coverage of workable quality. Based on scheduling analysis, it would appear that the Plesetsk D and E sites are in the terminal phase of construction and are either completed or will be completed during the third quarter of 1963. Tyumen A and C should be completed by the end of 1963. Evidence from the coverage of July 1963 suggests that Tyumen B may be inactive.

This same coverage indicates that Gladkaya is being altered from an SS-8 to an SS-7 facility. Gladkaya A has apparently been abandoned and an SS-7 soft site started nearby, while Gladkaya B, which was in an earlier stage of construction, is being modified to an SS-7 soft launch site. Construction of a probable hard launch site for the SS-7 system can be seen to the west of Gladkaya A.

Kozelsk sites, again based on construction cycle analysis, appear to be in the mid to early stages and should begin reaching operational status during 1964, providing they are not modified and there is no slowdown in construction.

LAUNCH COMPLEX F

Launch Complex F is located about 14 miles northwest of Launch Complex A and about 7 miles beyond Launch Complex E, at the terminus of the road which also serves Complex E. Construction of the Complex was first detected in September 1961 when photographic coverage revealed scarring and limited excavation. Photography of the Complex in April 1963, 19 months later, revealed that construction appears to be nearing completion (see figure 23);

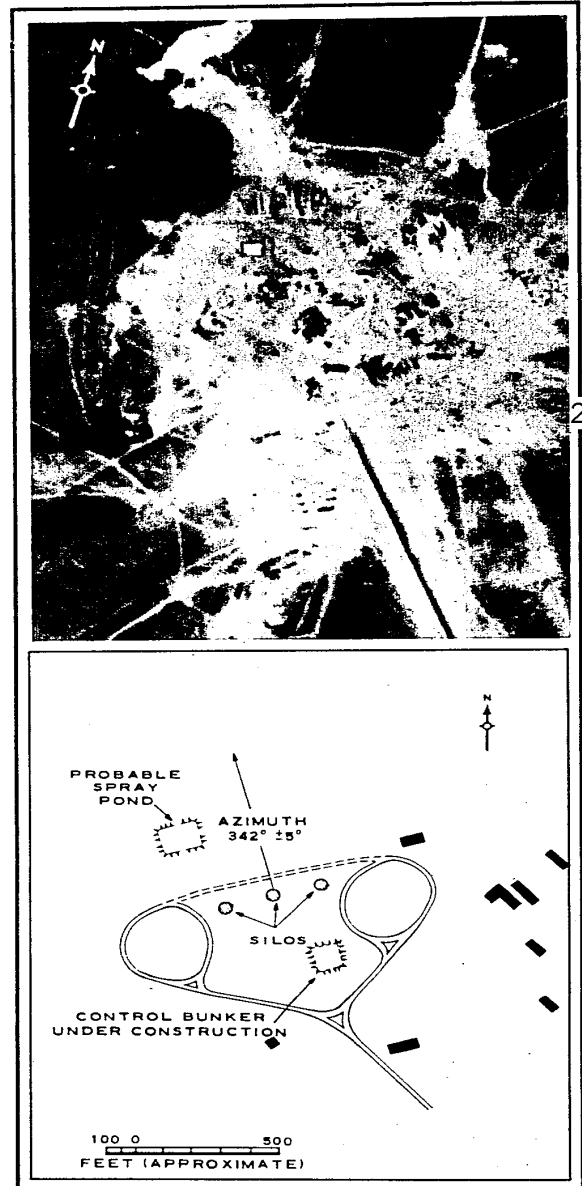


FIGURE 23. LAUNCH COMPLEX F, TYURATAM MISSILE TEST RANGE.

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but there is not yet any evidence of support facilities in the immediate vicinity of the Complex. The Complex now consists of a hardened launch site with three silos (each approximately 50 feet in diameter) located equidistance in linear pattern and with a center-to-center separation distance between each silo of approximately 180 feet, a spacing identical to that of the silos found at the SS-7 hard sites and at Tyuratam Complex D. A large control bunker has been constructed about 240 feet to the rear of the silos and appears to be centered between the two right silos.

Complex F is suspected to be a hardened launch site for the SS-8 ICBM. This premise is based primarily on its proximity to Launch Complex E at Tyuratam and detection of two hard sites at Omsk and Kozelsk which differ from the SS-7 hard sites. Omsk and Kozelsk are, therefore, considered to be possible deployment complexes for the SS-8 ICBM.

Despite the fact that Complex F has been covered 11 times by photography (as of July 1963) the quality has been so consistently poor that very little is known regarding the construction of this facility. The first good-quality photography of this Complex occurred in early October 1962, when construction had been underway at least 13 months. At that time, two dome-like objects were present in an excavation where the center and right silos are now located and the third or left silo appeared to be in a different stage of construction. Subsequently, the only other good coverage of Complex F (in April 1963) revealed a dome-like object at the third silo, but such objects were missing at the other two silos. This coverage also clearly disclosed the control bunker which is under construction in a separate excavation.

Unfortunately, photographic coverage of the two deployed sites at Omsk and Kozelsk, which are possibly similar to Complex F at Tyuratam,

is so limited that little additional detail of the construction sequences can be obtained. It does appear, however, that the time required for construction of the launch site at Complex F, although possibly slightly longer, will not differ significantly from the average time required for an SS-7 hard site (about 21 months).

As was the case at Launch Complex D, it cannot be determined conclusively if all three silos at Complex F are launch silos; however, three are considered probable. The hard launch site at Complex F has several striking similarities to the SS-7 hard sites at Complex D. Each has three silos in a linear pattern separated by 180 feet. The control bunker at Complex F, like the ones at Complex D, also appears to be aligned symmetrically to the center and right silos although it sets much farther to the rear and in a separate excavation. Thus, the left silo is farther from the control bunker than the other two. Construction of the left silo at Complex F appears to lag behind the other two, a phenomenon which was always apparent at the SS-7 hard sites. On the other hand, good quality coverage of the Omsk Complex A in June 1963 reveals three silos in the mid to late stage of construction, all of which appear somewhat similar to the silos seen at the SS-7 hard sites (figure 24).

As might be expected for a launch site designed to accommodate a different missile system, the construction of the launch site at Complex F differs from the hard launch sites at Complex D in at least two noteworthy ways. One, the control bunker is placed further to the rear of the silos at Complex F rather than close to the launch silos as at Complex D. Also possibly significant but unexplainable at the present time is the apparent absence of bunkers in between the silos at Complex F, such as were seen in the SS-7 hard site excavations and at D-1 and D-2.

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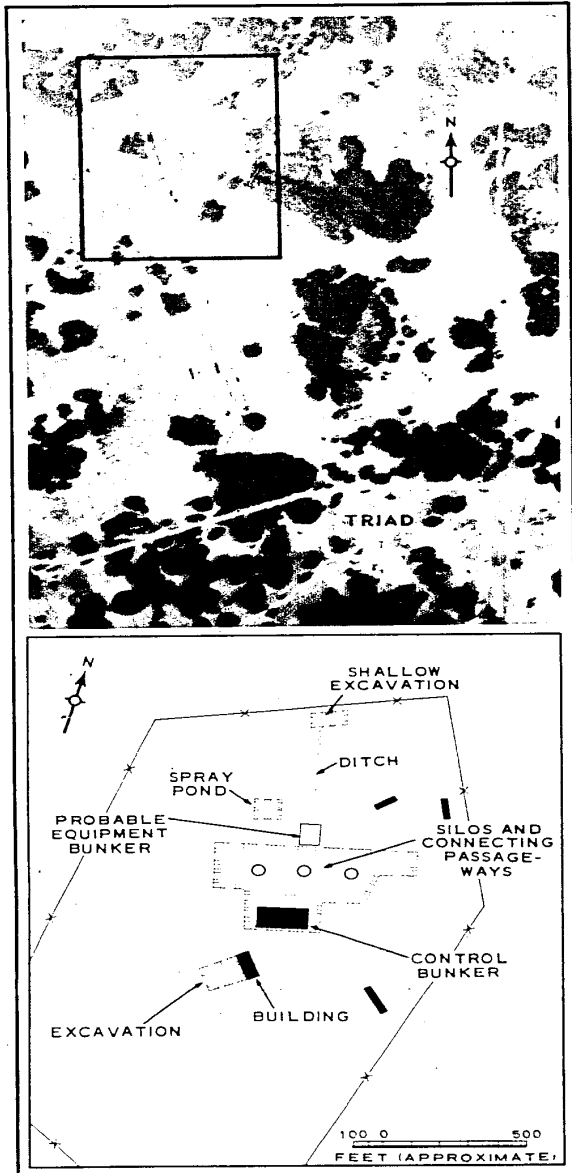


FIGURE 24. OMSK LAUNCH AREA A, JUNE 1963, POSSIBLE SS-8 OPERATIONAL HARD SITE.

Two critical facilities for support of the SS-8 missile system as now known have not yet been observed at Complex F. One is a hardened guidance facility and the other is hardened storage facilities for cryogenic fuels. For several technical reasons, the latter would be expected to be as close to the missiles as possible. The former should be located approximately 1,000 feet up range from the launch silos if SS-8 soft site geometry and the previously noted triad guidance system for the SS-8 is assumed. Although ground scarring and construction activity has been detected in areas at Complex F which would satisfy the above criteria, the quality of the photography and the number of similar-sized structures in the areas precludes identification of a triad configuration. On the other hand, a complex of structures which are oriented and interspaced correctly for a triad are seen at Omsk site A but located approximately 4,000 feet up range (see figure 24). The significance of this possible SS-8 guidance triad and its relationship to the hard site at Omsk site A cannot be assessed at this time. It would seem, however, that if the Omsk facility is intended as a hardened portion of the complex, then its hardness level must be significantly higher than the silo control bunker complex if the launch site vulnerability radius is not to be increased.

LAUNCH COMPLEX G

Launch Complex G remains the largest individual test complex at Tyuratam. Construction activity at this Complex, which apparently began sometime during the early summer of 1962, has progressed at a relatively rapid pace. The Complex now consists of the original launch area, a probable second launch area, and a single large support area (figure 25).

Photography of the original G launch area in June 1963 indicates that the railroad branches

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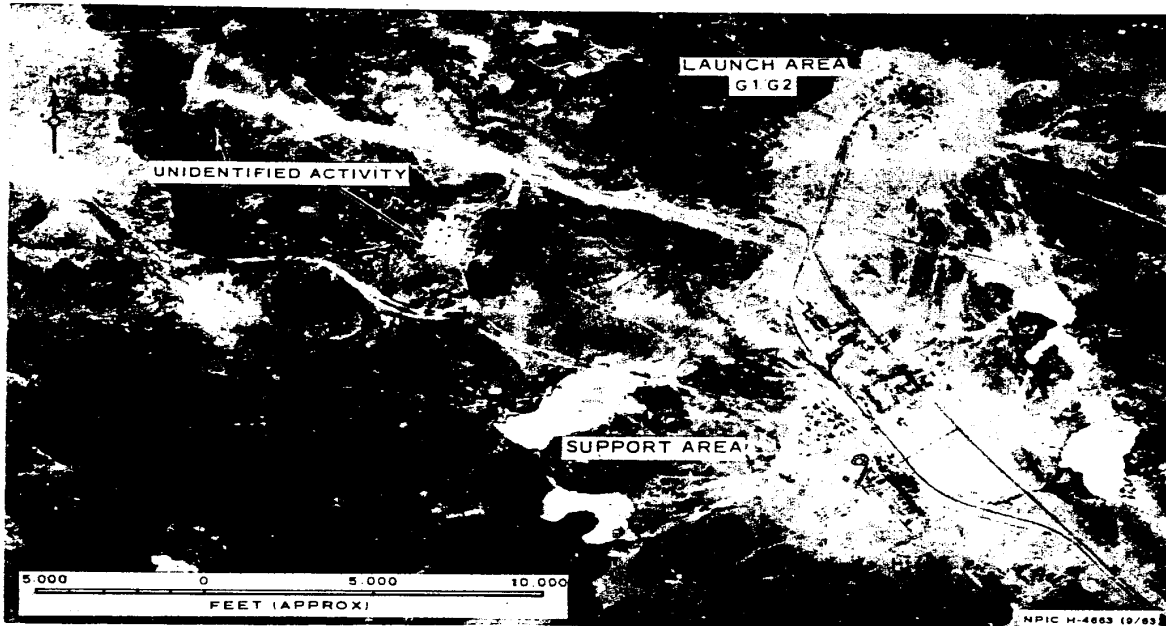


FIGURE 25. COMPLEX G, TYURATAM MISSILE TEST RANGE.

into a Y after it enters the area and that probably mirror-image launch sites, G-1 and G-2, are developing along the branches of the Y (figures 26 and 27). Most of the facilities visible in earlier photography, including the 70-foot-square structures, have been earth mounded or buried. No launch pads are yet discernible, but they are expected at the terminus of the two rail spurs. A tower approximately 115 feet high has appeared along the west rail spur. It cannot be determined at this time whether this tower is movable and whether it will be associated with a launch pad.

What is believed to be a second launch area is under construction about two nautical miles east of the G-1/G-2 area (figure 28). Construction of both rail and road approaches to this area were visible in April 1963. Since then, both the rail and the road have been extended to the launch

area, and work has begun within the area. Visible construction within the area consists of ditching similar to that which appeared during early construction of the G-1/G-2 area, possible construction of a railroad Y, and two large excavations in the general areas where the ends of the railroad Y should terminate. The entire area is oriented on about the same azimuth as the original launch area. Identification of this new area as a launch facility at this time, however, is tenuous; and later photography will be required to resolve the actual purpose of this construction.

The support area, located some one to two nautical miles south of the G-1/G-2 area can be generally divided into three sections, a technical support section, a construction support section, and an administration and housing section (figure 25). Construction is continuing in all three

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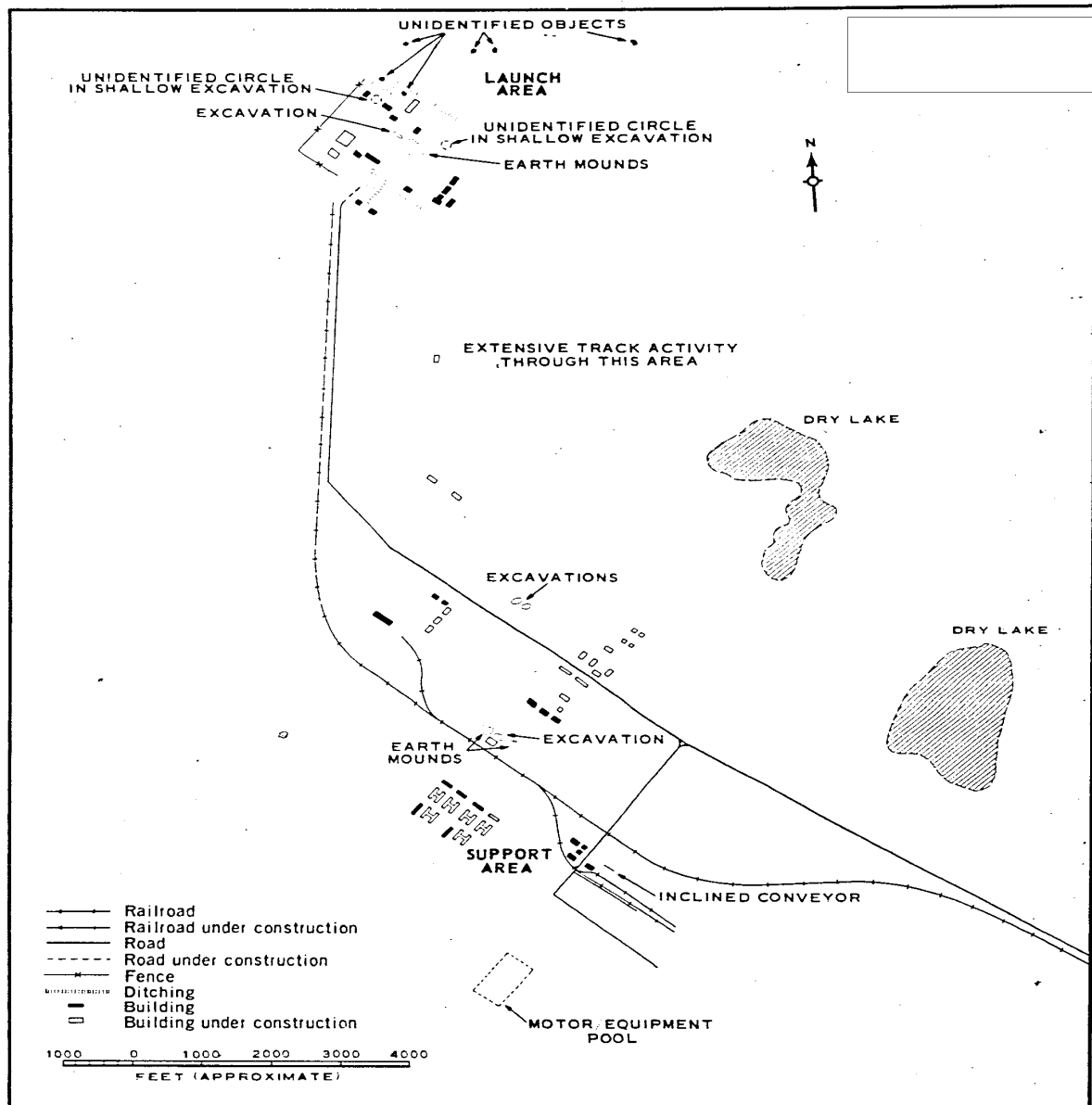


FIGURE 26. LAUNCH COMPLEX G, TYURATAM MISSILE TEST RANGE, OCTOBER 1962.

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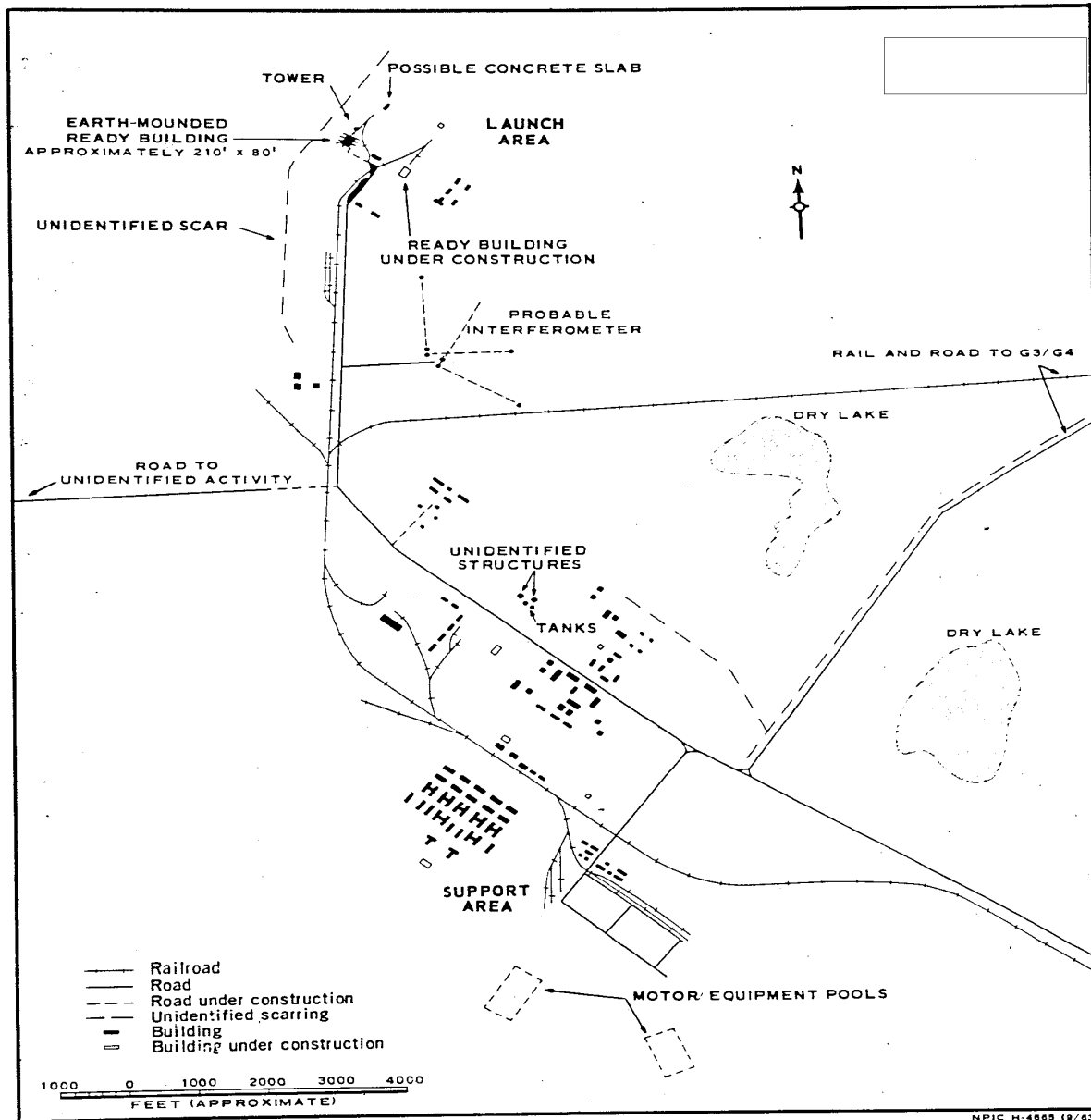


FIGURE 27. LAUNCH COMPLEX G, TYURATAM MISSILE TEST RANGE, JUNE 1963.

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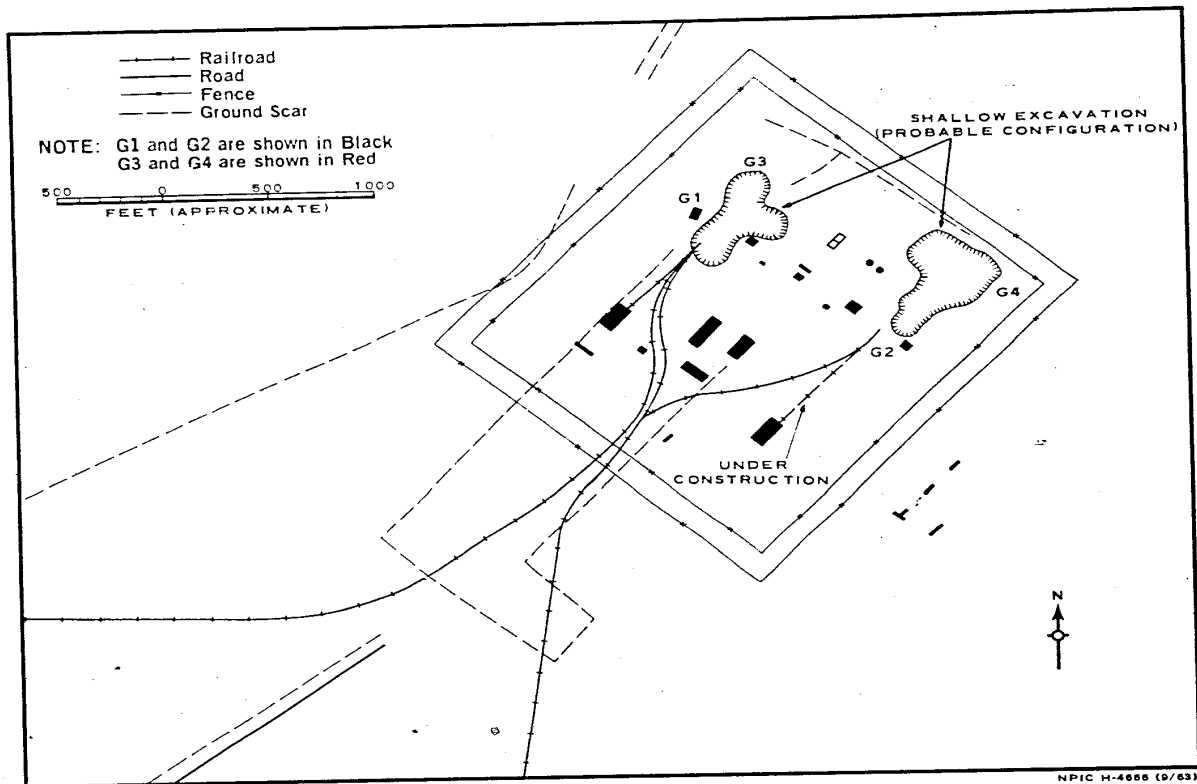


FIGURE 28. COMPARISON OF G-1/G-2 AREA AND G-3/G-4 AREA.

sections. The most significant structure in the support area, the large 400-foot-long missile-assembly building, appears to be complete; and recent photography has indicated that this building is rail served. That the support area is intended to support both the G-1/G-2 launch area and the new possible launch area to the east is indicated by the fact that the rail approach to the new area branches off of the main rail line just north of the support area. This arrangement permits both launch areas to utilize the missile assembly building as well as the other support area facilities adjacent to the rail line.

Other construction in the G Complex area

consists of an electronics facility and a new road. The electronics facility is located about one nautical mile south of the G-1/G-2 launch area. It consists of two L-shaped facilities, each of which have four dome-shaped objects located at the ends and near the intersection of the approximately 1,200-foot-long legs. One of these facilities has a leg oriented on the same general azimuth (35° to 40°) as the G-1/G-2 launch area. The bisector of the second L-shaped facility points in the same general direction. These electronic facilities are believed to be interferometers and are probably intended for missile tracking or guidance.

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A new road extends due west about 2.4 nautical miles from a point just north of the support facility and terminates in a large earth scar. Some buildings have been built or are being built both to the south and at the end of this road. Neither the purpose of this construction activity nor whether it is actually associated with Complex G can be determined at this time. The structures located in the facility south of the road, however, appear to be revetted.

The size of Complex G suggests that it may be space related. It appears destined to consist of at least two and probably four large launch sites, all possibly equipped to handle vehicles as large or larger than the SS-6. However, several unexplained anomalies are evident. First, although most of the facilities that are present in the G-1/G-2 launch area have been earth mounded or buried, the possible missile ready building to the rear of G-1 has not yet been protected on the side where a blast might be expected to originate, that is, the side facing the launch pad. Second, the construction in the G-1/G-2 area has now been underway, for the most part at an accelerated pace, for about a year and still no launch pads are visible. This suggests that the Complex G construction is not near completion and that the launch pads, when they finally do appear, will be much more simple structures than the large launch pads at Complexes A and B. A third anomaly is the close proximity of the launch sites to each other. If the G-1 and G-2 pads appear in the areas where they are expected, they will be only about 900 feet apart. This seems to be relatively close. However, it may have been possible to reduce pad separation by mounding the other facilities in the area, and with the possible additional launch area east of G-1/G-2, it may not be necessary to have missiles on G-1 and G-2 at the same time. These anomalies in conjunction with the revetted facility located to the west of

the G area suggest that if Complex G is not for a large space system then it is possible that it may be used as a test facility for a solid propellant ICBM. Additional coverage will be required to determine the purpose of this Complex.

Completion time of Launch Complex G is difficult to assess; but based upon the nonappearance of launch pads at this time, it is likely that the G-1/G-2 launch area will not be completed prior to mid-1964 and that the possible new launch area probably will not be completed until the end of 1964.

LAUNCH COMPLEX H

Complex H, located approximately two nautical miles east of Launch Complex C, was first identified in April 1963. A new rail spur extends into the area from the Complex C support area and a hard surface road extends into the area from the main road that serves Complexes C and D. The construction area at the terminus of this new rail spur and road is unfenced. The construction, in an early stage, consists of a number of buildings, both large and small, and a large irregular-shaped shallow excavation near the center of the area. No launch pads and no construction identifiable as that of launch pads is yet visible (figure 29).

An electronics facility is under construction in a secured area about one nautical mile southeast of Complex H. It is L-shaped and is probably an interferometer. In the last readable photography for this area, April 1963, one 1,200-foot-long leg of the facility was visible and an earth scar indicated that another leg was being built. One leg of the facility is oriented on the general azimuth to Kamchatka. The purpose of the L-shaped device is probably for missile tracking or guidance.

The support for Complex H is believed to be located in the support area for Launch Complex

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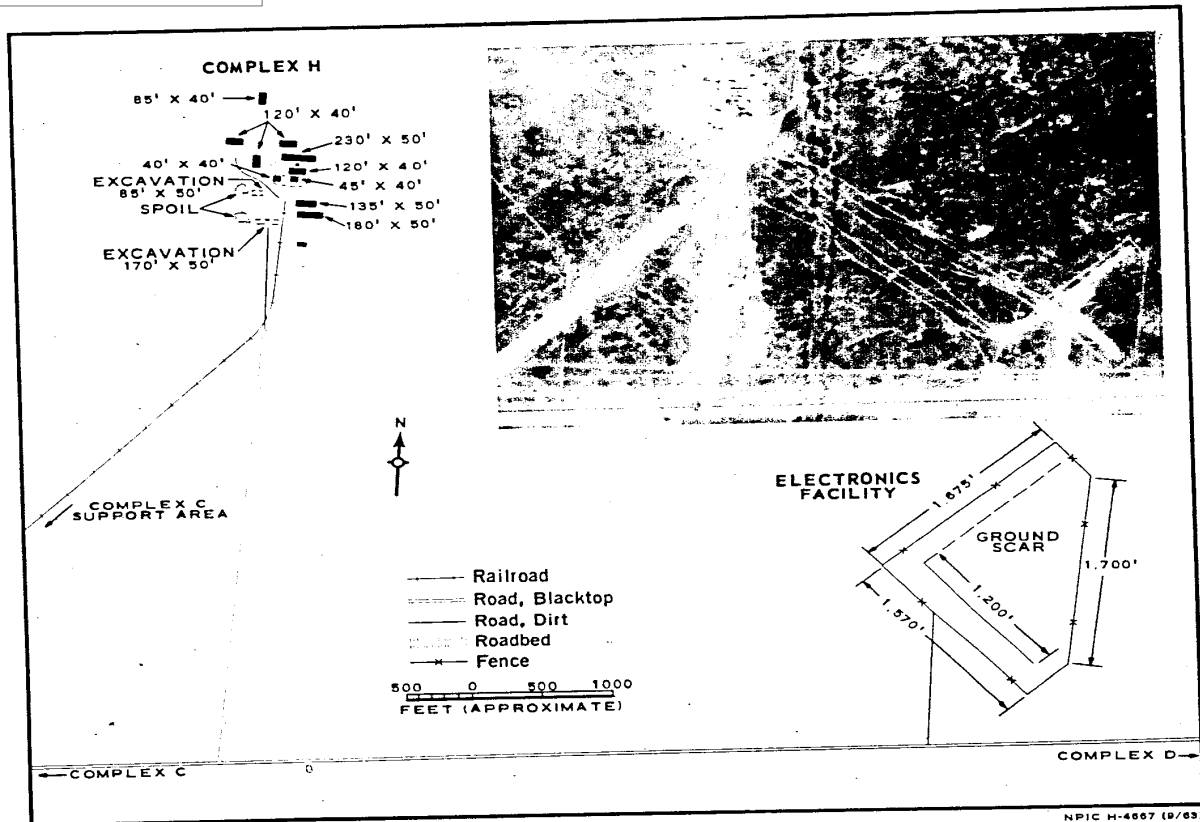


FIGURE 29. COMPLEX H, TYURATAM MISSILE TEST RANGE.

C south of the Complex C housing area. As of the last photography, the Complex H support area consisted of a number of buildings, most of which appeared to be of a barracks type.

The purpose of Complex H cannot be determined at this time. However, the fact that the area is both rail and road served, the fact that the area is being built in the same general direction as most previous Tyuratam launch points, and the close proximity of the above missile tracking or guidance device, strongly suggest that Complex H is intended to be another launch complex. Its location between Complex C and

Complex D, both of which are associated with the SS-7, and its proximity to the Complex C (SS-7) support area suggest that this facility may be for a radio-guided version of this system.

OTHER NEW CONSTRUCTION

Construction of a new road and rail line northward from a point just east of the Central Support Facility became evident on early April 1963 photography. The construction terminates approximately midway between Launch Complexes A and B. The most recent photography

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indicates that the construction had not yet progressed to the rail-laying stage. An earth-scarred area about 300 by 500 feet occurs at the terminus of the construction. Another earth-scarred area is located 1,300 feet back from the terminus. No building or excavation has been detected in either of these areas, and later photography will be required to determine the purpose of this activity. The fact that the construction has occurred in the same general direction as other Tyuratam launch points, however, suggests that another launch site is under construction.

Another new road and a rail line are being constructed in the area between Launch Com-

plexes A and E. The construction originates about 3.5 nautical miles southeast of Complex E and proceeds about 2 nautical miles northeastward to a point 2.5 nautical miles west of Launch Complex A. Again there is no evidence to indicate the purpose of this new construction. However, its location is compatible with it being another new missile launch area.

New construction has also been observed west of Complex G. The purpose of this area as well as its relation to Complex G cannot as yet be determined. The relative locations of these new areas in respect to the existing facilities may be seen on figure 1.

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BIBLIOGRAPHY

OSI-SR/62-27, New Launch Facilities Under Construction at Tyura Tam Missile Test Range USSR, Aug 62, TSC/T/KH

OSI-SR/SC/62-7, Soviet ICBM and IRBM Launch Facilities and Deployment Concepts, 15 Nov 62, TSC/T/KH

STL. Project Earshot, Tech Note No. TK-1, The SS-6 Missile Guidance System at Tyuratam and Plesetsk, 30 May 63, TSC/T/KH

STL. Project Earshot, Tech Note No. TK-2, Similarities Between Launch Complex A and Complex E at Tyuratam and the Type IV Sites at Tyumen, Gladkaya, Kozelsk, and Pletetsk, 8 Jul 63, TSC/T/KH

NPIC. R-76/63, Analysis of Hardened MRBM/IRBM and ICBM Launch Sites in the USSR, Apr 63, TS/KH

NOTE: For document retrieval purposes, the letters suffixed to the classification designators indicate dissemination systems as follows:

C - COMINT
T - Talent
KH - Keyhole

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